United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the Kentucky Agricultural Experiment Station, Kentucky Natural Resources and Environmental Protection Cabinet, and the United States Department of Agriculture, Forest Service

Soil Survey of Clay County, Kentucky

How To Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

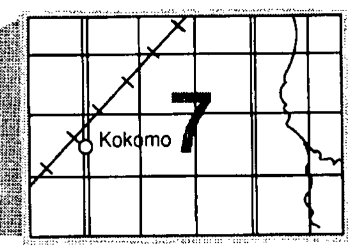
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

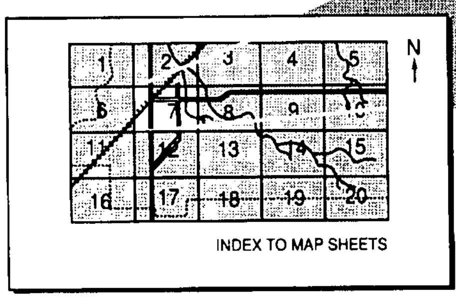
To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

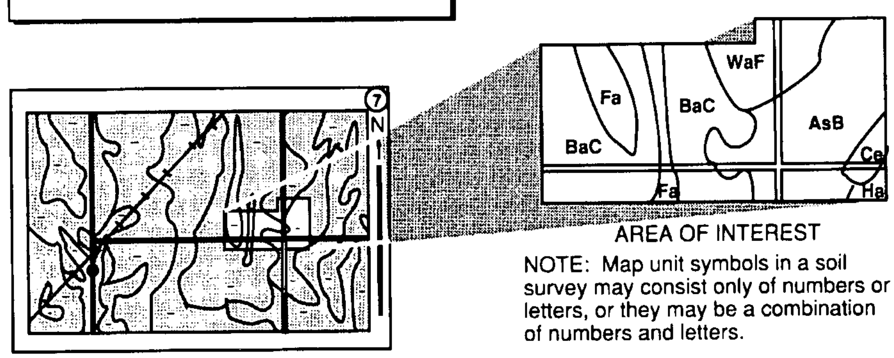
The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



MAP SHEET



INDEX TO MAP SHEETS



MAP SHEET

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1992. Soil names and descriptions were approved in 1994. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1992. Areas surfaced mined for coal are based on 1983-84 aerial photography. This survey was made cooperatively by the Natural Resources Conservation Service, the Kentucky Agricultural Experiment Station, the Kentucky Natural Resources and Environmental Protection Cabinet, and the United States Department of Agriculture, Forest Service. The survey is part of the technical assistance furnished to the Clay County Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Combs Lake, which is located in the Beech Creek Wildlife Area, is about 4 miles east of Manchester in Clay County.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov.

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Issued 2003

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

David Sawyer
State Conservationist
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Soil Survey of Clay County, Kentucky

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Fieldwork by J. Daniel Childress, Douglas B. Dotson, Richard L. Livingston, and Jerry E. McIntosh, Natural Resources Conservation Service; and Nathan H. Morgan, Kentucky Natural Resources and Environmental Protection Cabinet

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Kentucky Agricultural Experiment Station, the Kentucky Natural Resources and Environmental Protection Cabinet, and the United States Department of Agriculture, Forest Service

Clay County is in the southeastern part of Kentucky (fig. 1). It encompasses about 471 square miles, or 301,370 acres. It is bounded on the north by Jackson and Owsley Counties, on the east by Perry and Leslie Counties, on the south by Bell and Knox Counties, and on the west by Laurel County. Manchester, the largest town and the county seat, is located near the center of the county. About 21,000 people live in Clay County (U.S. Department of Commerce 1993).

Urban areas and farms and other rural areas that have been developed are along the more level stream bottoms and on the adjacent footslopes. The remainder of the acreage in the county consists of wooded hills, except for the areas recently surface-mined for coal. Coal mining is a major enterprise in Clay County.

This survey updates a previous soil survey for Clay County published in 1965 as part of the "Reconnaissance Soil Survey of Fourteen Counties in Eastern Kentucky" (McDonald and Blevins 1965). This soil survey provides updated soil series names and descriptions, larger maps that show the soils in greater detail, and additional information.

General Nature of the Survey Area

This section gives general information concerning the county. It describes history and settlement; physiography, relief, and drainage; soil, vegetation, and farming; mining and transportation facilities; and climate.

History and Settlement

Clay County was formed from parts of Madison, Knox, and Floyd Counties. It was recognized on December 2, 1806, but did not function as a county until April 1, 1807. The county was named after Green Clay, a major general in the War of 1812.

Early commercial development in the county was influenced by the discovery of salt. The salt industry was a source of considerable wealth and was the reason that the county was settled so rapidly. An early pioneer family helped to establish a saltworks at Garrard.

The last conflict between Native Americans and early settlers in Kentucky was in Clay County in March of 1795 (Johnson, L., personal communication).

Physiography, Relief, and Drainage

Clay County is part of the Cumberland Plateau and Mountains Region (Austin 1965). The Cumberland Plateau is a dissected plateau of varying altitude and relief. It is underlain by siltstone, shale, sandstone, and coal of the Pennsylvanian system. The differences in the kinds of soil forming material and the relief are mirrored in the general soil map units and in the landforms of the area.

Generally, the landscape is hilly and consists of sharp crests and deep, V-shaped valleys. The slopes

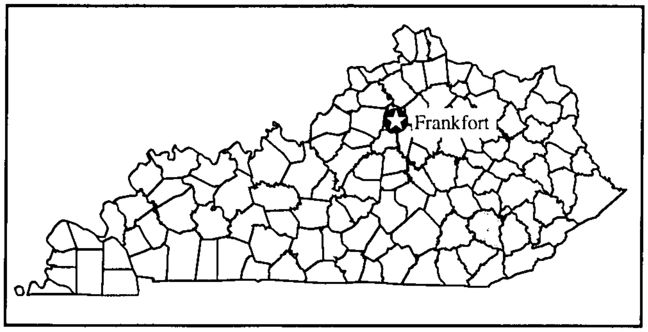

Figure 1.—Location of Clay County in Kentucky.

on the valley sides generally range from 35 to 75 percent. In many places the valley sides have moderately broad benches along the lower slopes. Areas along stream bottoms are nearly level or gently sloping. In a few places, the ridgetops are rounded and have slopes of 5 to 20 percent. The elevations along the stream bottoms range from about 200 to 700 feet above sea level. The ridgetops range from 1,000 to 1,500 feet above the stream bottoms.

Most of the area is in the upper part of the South Fork of the Kentucky River basin. Small areas are in the upper reaches of the Rockcastle River. The drainage pattern is generally dendritic like the branching of a tree, with the flow of most streams to the northeast or northwest.

Soils, Vegetation, and Farming

Soil scientists have determined that there are about 20 major kinds of soil in the area (see table 18). The soils range widely in texture, natural drainage, and other characteristics. Most of the steep hillsides are mantled by deep and very deep, loamy soils that contain varying amounts of rock fragments. Soils on the stream bottoms are loamy, with gravelly soils occurring only in the upper reaches of the streams. Generally, the topsoil is dark and is several inches thick. The subsoil is commonly pale and acid. Occasionally, the soils on stream bottoms are gray and wet for extended periods of time.

Second-growth deciduous forest consisting primarily of American beech, black locust, cucumbertree, yellow-poplar, and various species of oak and hickory covers about 85 percent of the land area of the county. These species are mixed with flowering dogwood, sweet birch, white ash, and white basswood on the cooler aspects of hillslopes. In areas where the soil is thin or droughty, either oak or oak mixed with pine is common. On some of the broader benches, populations of flowering dogwood, sweet gum, yellow-poplar, and Virginia pine are common. Some eastern hemlock grows in deep ravines of Clay County.

Most of the original forest has been cleared along the stream bottoms, and the areas are used for pasture, hay, corn, or tobacco. Most of the farms are small and include steep, wooded slopes as well. Many areas now considered too steep to farm were once cleared and used for pasture or corn. Some of the farmland along the stream bottoms has been converted to urban uses.

Mining and Transportation Facilities

Numerous bituminous coal seams, ranging from a few inches to several feet thick, occur in the sedimentary rocks of the Pennsylvanian system. Coal has been commercially mined in the area since the late 19th century. Most coal seams currently being mined are about 2 to 5 feet thick. Underground mines with drift entrances, as well as surface mines, are used for coal extraction. In 1985, about 1.7 million tons of coal was mined in Clay County (Kentucky Energy Cabinet 1986).

Oil and gas deposits occur mainly in the pre-Pennsylvanian rocks that lie a few hundred feet below the surface. Several oil and gas fields are producing in the area.

Highways, roads, and railroads generally follow the course of the streams. Major highways in the survey area are U.S. Highway 421 and the Daniel Boone Parkway. Manchester is served by a railroad spur, and several coal-loading facilities are located in the Manchester area. Commercial air services are available at Lexington, Kentucky.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Manchester, Kentucky, in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 36.6 degrees F and the average daily minimum temperature is 22.6 degrees. The lowest temperature on record, which occurred on January 21, 1985, is -18 degrees. In summer, the average temperature is 72.9 degrees and the average daily maximum temperature is 84 degrees. The highest recorded temperature, which occurred on July 28, 1952, is 104 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing

degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 49.04 inches. Of this, 25.44 inches, or 52 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 4.1 inches on October 17, 1989. Thunderstorms occur on about 55 days each year, with the most occurring in July.

The average seasonal snowfall is about 14.2 inches. On the average, 10 days of the year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 9.5 inches recorded on January 30, 1966.

The average relative humidity in midafternoon is about 58 percent. Humidity is higher at night, and the average at dawn is about 79 percent. The sun shines 64 percent of the time possible in summer and 42 percent in winter. The prevailing wind is from the northeast. Average windspeed is highest, 9 miles per hour, in December.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only

on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. The map units in the mountainous areas of the county are made up of two or more kinds of soil. The section "Survey Procedures" explains the specific procedures used in naming the map units. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

Survey Procedures

The general procedures followed in making this survey are described in the "National Soil Survey Handbook" of the Natural Resources Conservation Service and in the "Soil Survey Manual" (USDA 1993). The "Reconnaissance Soil Survey of Fourteen Counties in Eastern Kentucky" was used as a reference as well as other soil surveys in the Cumberland Plateau and Mountains Region (Austin 1965; McDonald and Blevins 1965).

Before fieldwork began, preliminary boundaries of slopes and landforms were plotted stereoscopically on quad-centered aerial photographs. These photographs were flown in 1976 and 1977 at a scale of 1:80,000 and enlarged to a scale of 1:24,000. U.S. Geological Survey geologic and topographic maps, which were at a scale of 1:24,000, were also used (USGS 1963, 1964a-d, 1974, 1975, 1976, 1978a-f). Map units were then designed according to the pattern of soils interpreted from photographs, maps, and observations in the field (USDA 1966).

Two levels of mapping intensity were used in this survey. More closely spaced observations were made in the valleys where the soils are used for agriculture or urban development. Less closely spaced observations were made in the hilly areas where the soils are used for woodland and wildlife habitat or are being mined for coal. For either level of mapping intensity, the information about the soils can be used to determine

soil management and to predict the suitability of the soil for various uses.

Valley areas.—Traverses were made by truck and on foot in the valleys. The soils were examined at intervals ranging from a few hundred feet to about one-fourth mile, depending on the landscape and soil pattern. Observations of such items as landforms, vegetation, and evidence of flooding were made continuously without regard to spacing. Soil boundaries were determined on the basis of soil examination, observations, and photo interpretations. Many of these boundaries are precise because of the abrupt change of the landform, such as where the very steep slopes intersect the flood plain. The soils were examined with the aid of a hand soil probe, bucket auger, or spade to a depth of about 3 to 5 feet. The typical pedons were described in pits that were dug by hand. Additional soil descriptions were obtained using statistical sampling techniques. These were used to determine the composition of many of the map units.

Mountainous areas.—Traverses in the mountainous areas were made by truck and on foot on the existing network of roads and trails. These traverses were commonly made a few miles apart where the geologic materials and landscape were uniform. In areas where differences in the geologic materials or the landscape were observed, traverses were made at intervals close enough for the soil scientist to observe any differences among the soils. Soil examinations on the traverses were made at intervals ranging from a few hundred feet to about 0.25 mile apart. Observations of such items as landforms and vegetation were made continuously without regard to spacing. Where soil profiles were readily observable (such as along recently constructed mining access roads and along highwalls and logging roads), observations of the content of rock fragments, depth to bedrock, depth of rooting, the landform, and underlying materials were made without regard to spacing. Soil boundaries were plotted stereoscopically on the basis of the parent material, landform, and relief. Many of these boundaries cannot be exact because they fall within a zone of gradual change between landforms, such as where a mountain crest becomes a mountainside. Much intermingling of the soils occurs in these areas. Soil descriptions were then obtained using statistical sampling techniques. These were used to determine the composition of the map units.

Samples for chemical and physical analyses were taken from the site of the typical pedon of some of the major soils in the survey area. Soils were analyzed by the Kentucky Agricultural Experiment Station. Commonly used laboratory procedures were followed (USDA 1984).

After completion of the soil mapping on quad-centered aerial photographs, map unit delineations were transferred by hand to orthophotographs at a scale of 1:24,000. Surface drainage and cultural features were transferred from U.S. Geological Survey 7.5 minute topographic maps and were supplemented by field observations.

Statistical Sampling and Analysis

Statistical sampling techniques were used to obtain objective data on the components or kinds of soil that make up the map units. The number of sampling stages and the methods used varied according to the ease in obtaining data and to the kind of data that was obtained (Steel and Torrie 1960).

Prior to the statistical sampling of map units, a study was made on the short distance variability of the soils in order to optimize the transects (Wilding and Drees 1983). Two transects—one on a warm slope and one on a cool slope—were made with 50 points at intervals of 50 feet.

Initially, about four delineations were randomly sampled from a larger population of delineations of each map unit (Steers and Hajek 1979). Each delineation was stratified, where possible; and within each stratum, points were selected using random point-intercept transects or random observations. Some examples of strata that were used are as follows: In the hilly areas, strata representing the upper, middle, and lower thirds of the hill were used, and in other units, differences in items such as landform, vegetation, or distance to the stream channel were used according to the situation.

Four points located 200 feet apart were used in each stratum in the hilly areas. These points were along a line roughly at a 45-degree angle to the pattern of the ephemeral streams on the hillside (Blandford 1987). Generally, two points located 100 or 200 feet apart were used within each stratum on map units along the flood plains and in areas that had been disturbed by surface mining. At each point, soil profiles were described and classified using field procedures and tabulated as to whether they were a named component, a similar soil, or a contrasting inclusion.

Similar soils are soils that are within the normal error of observation (USDA 1975). Normal errors of observation (absolute error) for several soil properties in the survey area are as follows: percent clay—3 to 5; percent sand—10 to 15; percent rock fragments—5 to 10; colors—one unit of hue, value, or chroma;

pH—0.5 to 0.75; and percent base saturation—25. Where compared to data from pedons sampled during fieldwork, field estimates were within these errors of observation four out of five times. In some map units the normal error range for similar soils was broadened to facilitate naming where use and management would not be affected.

Data from the initial sample were used to determine the required number of observations for each map unit. Stein's two-stage sample test (Steel and Torrie 1960) was used with a desired interval of 10 percent about the mean (absolute error) and a confidence level of 0.90. Where an additional number of observations were indicated by this test, additional delineations were sampled or the desired interval was increased to 15 percent about the mean (absolute error), or both.

The average composition of the delineations for each map unit was calculated along with simple statistics based on an approximation of the binomial distribution (Bigler and Liudahl 1984; Brubaker and Hallmark 1991). The results are given in table 17.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Shelocta-Cloverlick-Highsplint

Steep and very steep, deep and very deep, well drained soils; on ridgetops, side slopes, and footslopes of hills and mountains

This map unit consists of soils on dissected hills and mountains. It occupies the eastern two-thirds of Clay County and extends into the southern reaches, south of Highway 80 (fig. 2). These soils formed in material weathered from interbedded siltstone, shale, and fine grained sandstone. The underlying bedrock is of Pennsylvanian age. It contains numerous coalbeds, ranging from a few inches to about 5 feet in thickness. Elevation along the hillcrests generally ranges from 1,500 to 1,600 feet but ranges from 1,200 to as much as 2,000 feet in the southernmost portion of the county. Slopes range from 2 to 100 percent, but they dominantly range from 35 to 75 percent.

This map unit makes up about 80 percent of the county. It is about 35 percent Shelocta soils, 8 percent Cloverlick soils, and 7 percent Highsplint soils. Of minor extent in this map unit are the Gilpin, Kimper, and Sequoia soils, which make up 18 percent of the unit, and unnamed soils, which make up the remaining 32 percent.

Shelocta soils are steep and very steep. These deep, well drained soils are on side slopes and footslopes. Typically, they have a surface layer of brown loam. The subsoil is yellowish brown silt loam and channery silty clay loam.

Cloverlick soils are steep and very steep. These very deep, well drained soils are on cool side slopes and in coves. They have a surface layer of very dark grayish brown and dark brown channery loam. The subsoil is brown and yellowish brown very channery and extremely channery loam.

Highsplint soils are steep and very steep. These very deep, well drained soils are on warm side slopes and footslopes. They have a surface layer of yellowish brown loam. The subsoil is yellowish brown channery loam and very flaggy loam. The substratum is yellowish brown, mottled extremely flaggy sandy clay loam.

Gilpin, Kimper, and Sequoia soils are in landscape positions similar to those of the major soils.

Most areas of this map unit are used as woodland. Approximately one-third of this unit consists of the Redbird Purchase Unit, which is administered by the Daniel Boone National Forest. A few areas along the narrow flood plains and on some of the hill summits have been cleared of trees and are used for farming.

These soils are generally unsuitable for farming because of the steep and very steep slopes and surface stoniness. Some areas of minor soils on nearly level flood plains, gently sloping to moderately steep footslopes, and hill summits are suited to, and are used for, cultivated crops and pasture. The minor soils that are suitable for farming make up only about 2 percent or less of the map unit.

These soils are suited to woodland and to woodland wildlife habitat. Woodland productivity is

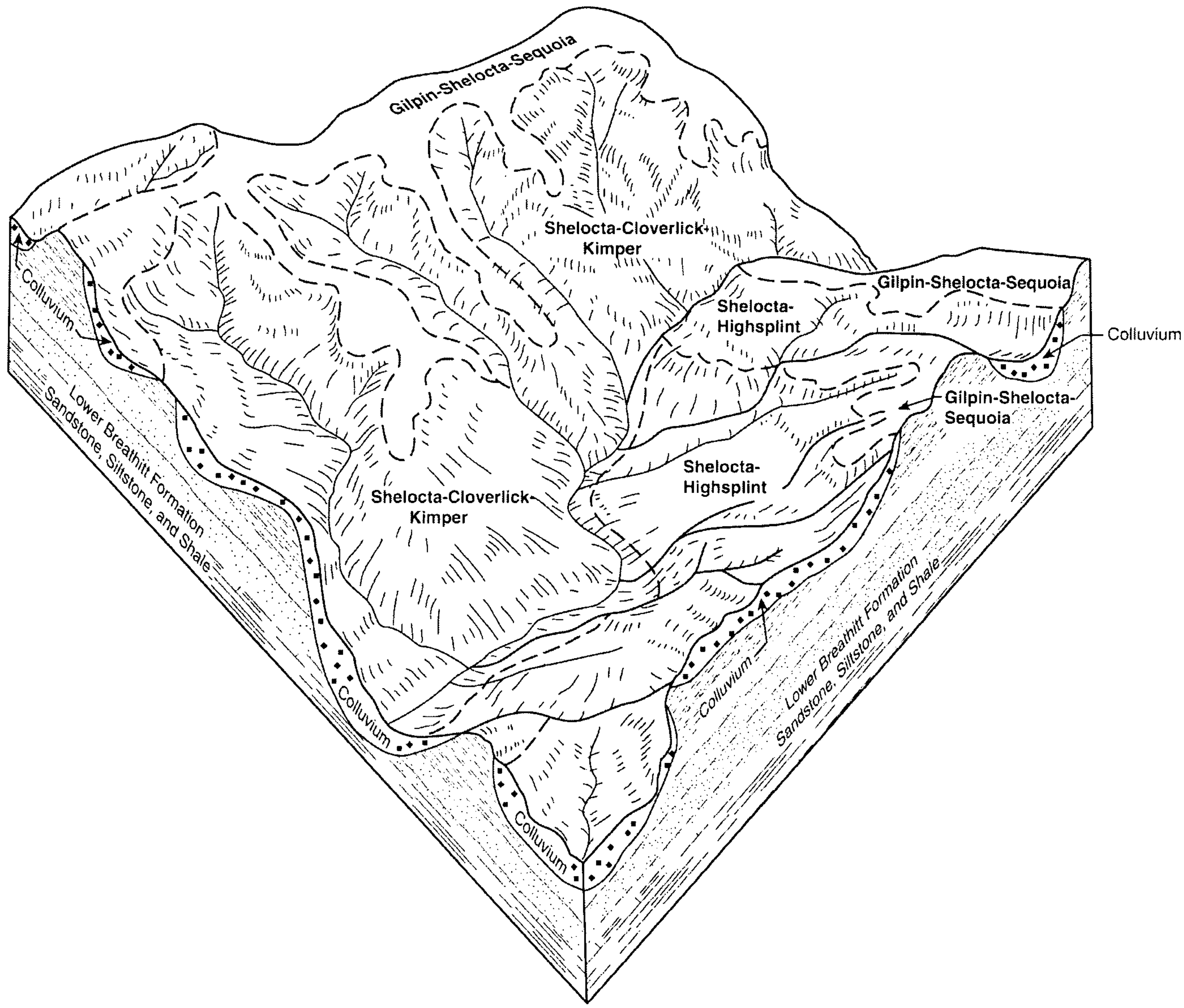

Figure 2.—Typical pattern of soils and parent material in the Shelocta-Cloverlick-Highsplint general soil map unit. This unit covers about 80 percent of the county. Most areas are hilly and forested.

moderate on the ridgetops and on the south- and west-facing side slopes. It is high on the north- and east-facing slopes. Common tree species are American beech, white oak, chestnut oak, sugar maple, and yellow-poplar. The main management concerns are the hazard of erosion, the equipment limitation, and plant competition.

Most areas of these soils are generally unsuited to urban development because of the steep and very steep slopes.

2. Shelocta-Fairpoint-Bethesda-Gilpin

Gently sloping to very steep, very deep to moderately deep, well drained soils; on side slopes and ridgetops of hills and in areas surface mined for coal

This map unit consists of soils on dissected hills, primarily north and west of Manchester, and soils in small pockets, east and south of Manchester, that have been extensively surface mined for coal. The

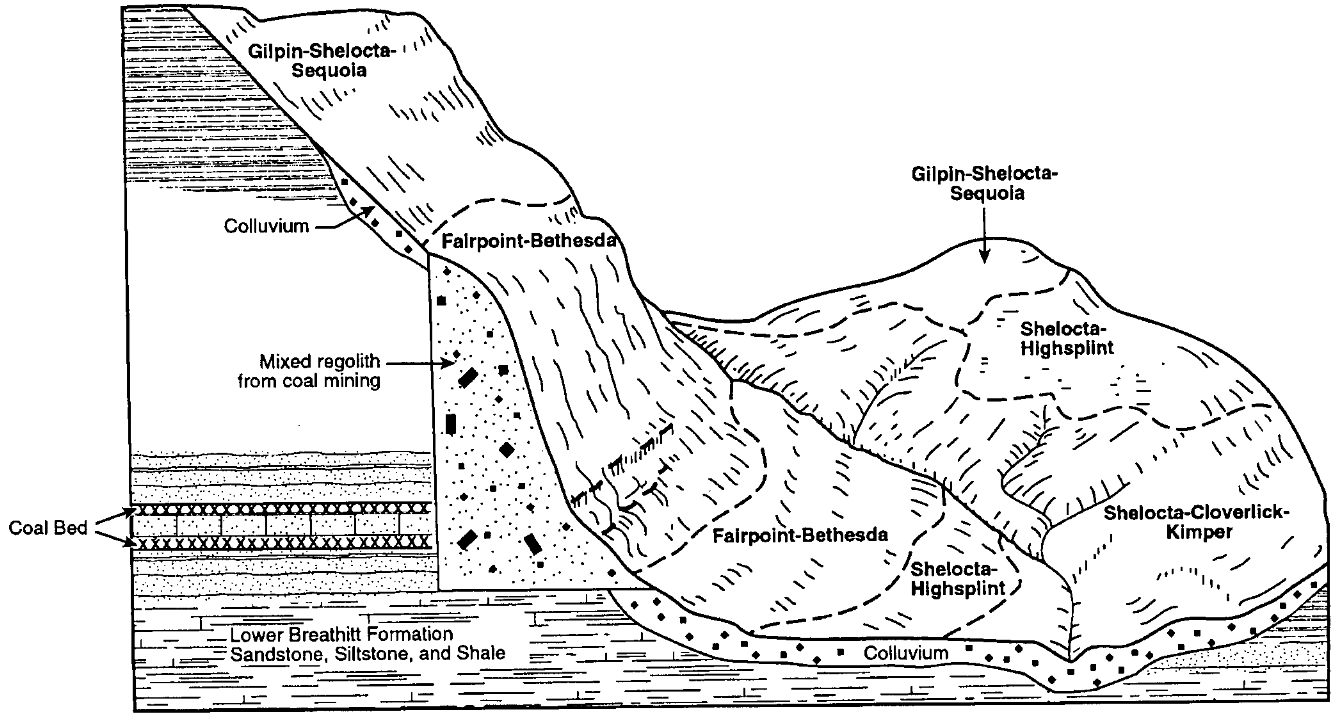

Figure 3.—Typical pattern of soils and parent material in the Shelocta-Fairpoint-Bethesda-Gilpin general soil map unit. This map unit is primarily in the west-central part of the county. It has been extensively mined for coal.

ridgetops are narrow and winding, and the side slopes are long and steep (fig. 3). These soils formed in material weathered from interbedded siltstone, shale, and fine grained sandstone. The underlying bedrock is of Pennsylvanian age. In many places the side slopes are broken by narrow benches created during contour mining of the Manchester coal seam at about the 1,000-foot-elevation contour. Slopes generally range from 2 to 75 percent. Some of the broader ridges and areas that have been surface mined for coal have slopes ranging from 2 to 35 percent. Elevation from the ridgetop to the valley floor ranges from about 350 to 450 feet.

This map unit makes up about 12 percent of the county. It is about 23 percent Shelocta soils, 18 percent Fairpoint soils, 8 percent Bethesda soils, and 7 percent Gilpin soils. Of minor extent in this map unit are the Highsplint, Kimper, Cloverlick, and Sequoia soils, which make up about 15 percent, and unnamed soils, which make up the remaining 29 percent.

Shelocta soils are steep and very steep. These deep, well drained soils are on sidesteps and footslopes. They have a surface layer of brown loam. The subsoil is yellowish brown silt loam and channery silty clay loam.

Fairpoint soils are gently sloping to very steep. These very deep, well drained soils are on ridgetops, structural benches, and side slopes and in hollow fills. Most areas of these soils are the result of surface mining of coal. Some were formed as a result of highway construction or other extensive earthmoving operations. These soils have a surface layer of yellowish brown channery silty clay loam. The substratum is yellowish brown and brownish yellow very channery and extremely channery silty clay loam.

Bethesda soils are gently sloping to very steep. These very deep, well drained soils are on ridgetops, structural benches, and side slopes and in hollow fills. Most areas of these soils are the result of surface mining of coal. Some were formed as a result of highway construction or other extensive earthmoving operations. These soils have a surface layer of olive brown and dark olive gray channery silt loam. The substratum is dark gray and olive gray very channery and extremely channery silty clay loam.

Gilpin soils are steep and very steep. These

moderately deep, well drained soils are on ridgetops. They have a surface layer of brown loam and a subsurface layer of light yellowish brown loam. The subsoil is brownish yellow loam, channery silt loam, and channery silty clay loam. Below this is a thin layer of weathered siltstone underlain by interbedded sandstone and shale bedrock.

Highsplint, Kimper, Cloverlick, and Sequoia soils are in landscape posiitons similar to those of the major soils.

Most areas of this map unit are used as woodland. Some areas on the broader ridgetops, the more gently sloping footslopes and stream terraces, and the narrow flood plains have been cleared of trees and are farmed. Building site development also is prevalent in these areas.

Extensive areas of mine soils have been created primarily as a result of surface mining operations. Most of the acreage in these areas is idle land; however, some degree of vegetative cover, either natural or planted, has been established for erosion-control purposes.

The soils in this map unit are generally unsuited to farming because of the steep and very steep slopes; however, the nearly level soils on narrow flood plains, the less sloping soils along footslopes and stream terraces, and the ridgetops are suited to farming and are used for cultivated crops or pasture. Minimizing soil loss and maintaining fertility are the main management concerns.

These soils are suited to woodland and to woodland wildlife habitat. Woodland productivity is moderate in areas of the Fairmont soils, on ridgetops, and on south- and west-facing side slopes. On the north- and east-facing side slopes, woodland productivity is high. The hazard of erosion, the equipment limitation, and plant competition are the major management concerns.

Most areas of these soils are poorly suited to urban development because of the steep slopes and the hazard of flooding on the narrow flood plains. In addition, slippage or subsidence, or both, can severely limit urban development in areas that were previously mined; however, the soils on some of the less sloping, broad ridgetops and those along footslopes and stream terraces that are not flooded may have potential as sites for buildings. Minimizing slope is the main management concern. In some places depth to bedrock is a limitation on sites for dwellings with basements. The depth to bedrock, slope, and, in some places, slow permeability are the main limitations on sites for septic tank absorption fields.

3. Pope-Shelocta-Gilpin

Nearly level to steep, very deep to moderately deep, well drained soils; on floodplains and on side slopes, ridgetops, and footslopes of hills

This map unit consists of soils on nearly level flood plains and gently sloping to steep side slopes, ridgetops, and footslopes (fig. 4). Slopes range from 0 to 75 percent. They dominantly range from 0 to 2 percent on flood plains and from 2 to 35 percent on side slopes, ridgetops, and footslopes.

This map unit makes up about 8 percent of the county. It is primarily along Goose Creek, Sexton Creek, and Red Bird River and near the community of Fogertown. It is about 22 percent Pope soils, 16 percent Shelocta soils, and 13 percent Gilpin soils. Of minor extent in this map unit are the Philo and Stokley soils and areas of Urban land. These minor components make up about 16 percent of the county. The remaining 33 percent consists of other minor soils, including the Stendal, Cataco, and Cottonbend soils.

Pope soils are nearly level. These very deep, well drained soils are on flood plains. They have a surface layer of brown loam. The upper part of the subsoil is brown loam, and the lower part is dark yellowish brown loam. The substratum is dark yellowish brown fine sandy loam.

Shelocta soils are steep and very steep. These deep, well drained soils are on side slopes and footslopes. Typically, they have a surface layer of brown loam. The subsoil is yellowish brown silt loam and channery silty clay loam.

Gilpin soils are steep and very steep. These moderately deep, well drained soils are on ridgetops. They have a surface layer of brown loam and a subsurface layer of brownish yellow loam. The subsoil is yellowish brown loam, channery silt loam, and channery silty clay loam. Below this is a thin layer of weathered siltstone underlain by interbedded sandstone and shale bedrock.

Philo, Stokley, and Stendal soils are on flood plains. Cotaco and Cottonbend soils are on stream terraces.

Most areas of this map unit have been cleared of trees and are used for cultivated crops, hay, or pasture. Many are used for building site development.

These soils are well suited to row crops, such as corn and tobacco, as well as the commonly grown garden crops. The primary row crops are corn and

Figure 4.—An area of the Pope-Shelocta-Gilpin general soil map unit. The flood plain and toeslopes are typical of the area around Fogertown, in the eastern part of Clay County.

tobacco. The main management concerns are flooding, maintaining tilth and fertility, controlling erosion, and minimizing compaction.

These soils are well suited to grasses and legumes. The main pasture and hayland management concerns are preventing overgrazing and maintaining a good stand. Flooding is also a concern in areas of the Pope soils used for legumes.

Although most of the acreage is cleared, this map unit is well suited to woodland. It is also well suited to openland wildlife habitat. Woodland productivity is high or moderate. Because site conditions are generally favorable, plant competition is the main management concern.

Many areas of this map unit are used for building site development. Shelocta soils are suited to building site development in areas where the slope and the depth to bedrock are not limiting factors. In places slow permeability is an additional limitation on sites for septic tank absorption fields. Pope soils are generally unsuited to urban development unless guidelines and restrictions for building on a flood plain are followed.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils are rated as to their suitability. They are divided into three groups—well suited, suited, and unsuited.

Soils that are *well suited* have favorable properties for the specified use and limitations are easy to overcome. Good performance and low maintenance can be expected.

Soils that are *suited* have moderately favorable properties for the selected use. One or more properties make these soils less desirable than well suited soils.

Soils that are *unsuited* have one or more properties unfavorable for the selected use. Overcoming the limitations requires special designs, extra maintenance, or costly operation.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is

divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Allegheny loam, rarely flooded, is a phase of the Allegheny series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Shelocta-Highsplint complex, 35 to 75 percent slopes, very stony, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Fairpoint and Bethesda soils, 2 to 20 percent slopes, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Dumps, mine; tailings; and tipples is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas

Ag—Allegheny loam, rarely flooded

This very deep, well drained, nearly level soil is on stream terraces and alluvial fans. Slopes are smooth and range from 0 to 2 percent. Most areas of this soil are teardrop in shape and range from about 6 to 60 acres.

Typically, the surface layer is brown loam about 8 inches thick. The subsoil, to a depth of 80 inches, is yellowish brown loam and mottled gray and brown below 25 inches.

This soil is low in natural fertility and moderate in organic matter content. The available water capacity is high. Permeability is moderate. The number of roots decreases gradually with depth and there are generally few roots below about 25 inches. Flooding on most areas is rare, with the flooding interval ranging from about 1 to 5 times in 100 years. These floods are of brief duration. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Cotaco and Pope soils on low stream terraces and small areas of Craigsville and Yeager soils on flood plains and small areas of Lonewood and Shelocta soils on footslopes and structural benches. Shelocta soils lack water-worn pebbles. Lonewood soils have siliceous mineralogy. Included soils make up about 10 percent of this map unit.

Most areas of this soil are used for growing cultivated crops (fig. 5). Some areas of this soil are in pasture.

This soil is well suited to growing cultivated crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are maintaining tilth and fertility. Flooding is rare and covers this soil for 2 to 7 days. It usually occurs in the late winter or early spring. Where summer crops such as corn are grown, this flooding generally does not interfere with farming operations or damage the crop. On some areas runoff from adjacent hill slopes can cause gully erosion or can deposit gravel. This runoff can be carried around the field with diversion terraces or across the field in waterways. This soil has good tilth. Conservation tillage and the use of cover crops help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to grasses and legumes. Species such as tall fescue and lespedeza are tolerant of acid, infertile subsoil conditions and are best suited. However, with adequate lime and fertilizer good yields can be obtained from most forage species. Pasture management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction and loss of stand. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture in good condition.

This soil is well suited to growing trees. Productivity is moderate. An average stand of yellow-poplar growing on this soil would reach a height of about 93 feet in 50 years under fully stocked, unmanaged conditions. Plant competition is the major soil management concern. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions.

Figure 5.—An area of Allegheny loam, rarely flooded, that has been cultivated and is ready for planting.

A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

This soil generally is unsuited to building site development due to rare flooding. Following guidelines and restrictions for building in a flood-prone area may reduce this hazard.

This soil is in capability class I.

AlB—Allegheny loam, 2 to 6 percent slopes

This very deep, well drained, gently sloping soil is on stream terraces and alluvial fans. Slopes are smooth. Most areas of this soil are teardrop in shape and range from about 6 to 30 acres.

Typically, the surface layer is brown loam about 8 inches thick. The subsoil, to a depth of 80 inches, is yellowish brown loam and mottled gray and brown below 25 inches.

This soil is low in natural fertility and moderate in organic matter content. The available water capacity is high. Permeability is moderate. The number of

roots decreases gradually with depth and there are generally few roots below about 25 inches. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Cotaco and Pope soils on low stream terraces and small areas of Craigsville and Yeager soils on flood plains and small areas of Lonewood and Shelocta soils on footslopes and structural benches. Shelocta soils lack water-worn pebbles. Lonewood soils have siliceous mineralogy. Included soils make up about 10 percent of this map unit.

Most areas of this soil are in pasture. Many areas, once cleared and used for farming, have reverted to woodland. A few areas are used for cultivated crops and gardens.

This soil is well suited to growing cultivated crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are keeping erosion to a minimum and maintaining tilth and fertility. On some areas runoff from adjacent hill slopes can cause gully erosion or can deposit gravel. This runoff can be carried around the field with diversion terraces or across the field in waterways. Terraces, conservation tillage, and crop rotation can be used to reduce erosion. There are no soil limitations to the construction and use of terraces. Crop rotations with about 1 out of 4 years in grass or legume meadow are needed to control erosion on most areas. Conservation tillage can be used to grow continuous crops on many areas. Conservation tillage and the use of cover crops help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to grasses and legumes. Species such as tall fescue and lespedeza are tolerant of acid, infertile subsoil conditions and are best suited. However, with adequate lime and fertilizer good yields can be obtained from most forage species. Pasture management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction, loss of stand, and excessive runoff. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture in good condition.

This soil is well suited to growing trees. Productivity is moderate. An average stand of yellow-poplar growing on this soil would reach a height of about 93 feet in 50 years under fully stocked, unmanaged conditions. Plant competition is the major soil management concern. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

This soil is suited to building site development. There are no soil limitations for dwellings and commercial buildings. In places where depth to bedrock is less than 72 inches, soil depth is a limitation for conventional septic tank absorption fields.

This soil is in capability subclass IIe.

AlC—Allegheny loam, 6 to 12 percent slopes

This very deep, well drained, sloping soil is on stream terraces and alluvial fans. Slopes are smooth. Most areas of this soil are nearly oval in shape and range from about 6 to 30 acres.

Typically, the surface layer is brown loam about 8 inches thick. The subsoil, to a depth of 80 inches, is yellowish brown loam and mottled gray and brown below 25 inches.

This soil is low in natural fertility and moderate in organic matter content. The available water capacity is high. Permeability is moderate. The number of roots decreases gradually with depth and there are generally few roots below about 25 inches. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Cotaco and Pope soils on low stream terraces, small areas of Craigsville and Yeager soils on flood plains, and small areas of Lonewood and Shelocta soils on footslopes and structural benches. Shelocta soils lack water-worn pebbles. Lonewood soils have siliceous mineralogy. Included soils make up about 10 percent of this map unit.

Most areas of this soil are in pasture. Many areas, once cleared and used for farming, have reverted to woodland. A few areas are used for cultivated crops and gardens.

This soil is suited to growing cultivated crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are

keeping erosion to a minimum and maintaining tilth and fertility. On some areas runoff from adjacent hill slopes can cause gully erosion or can deposit gravel. This runoff can be carried around the field with diversion terraces or across the field in waterways. Terraces, conservation tillage, and crop rotation can be used to reduce erosion. There are no soil limitations to the construction and use of terraces. Crop rotations with about 1 out of 4 years in grass or legume meadow are needed to control erosion on most areas. Conservation tillage can be used to grow continuous crops on many areas. Conservation tillage and the use of cover crops help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to grasses and legumes. Species such as tall fescue and lespedeza are tolerant of acid, infertile subsoil conditions and are best suited. However, with adequate lime and fertilizer good yields can be obtained from most forage species. Pasture management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction, loss of stand, and excessive runoff. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture in good condition.

This soil is well suited to growing trees. Productivity is moderate. An average stand of yellow-poplar growing on this soil typically would reach a height of about 93 feet in 50 years under fully stocked, unmanaged conditions. Plant competition is the major soil management concern. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

This soil is suited to building site development. Slope is a limitation for dwellings and commercial buildings. In places, where depth to bedrock is less than 72 inches, soil depth is a limitation for conventional septic tank absorption fields.

This soil is in capability subclass IIIe.

BaB—Barbourville loam, 2 to 8 percent slopes

This very deep, well drained, gently sloping soil is on footslopes and alluvial fans. These areas commonly lie at the mouth of drainageways that dissect the side slopes of hills. On most areas the elevations range from about 800 to 1,000 feet. Commonly, the shape of the slope downhill is slightly concave and across the contour it is convex, except where broken by a stream channel. Most areas of this soil are nearly oval or pear-shaped and range from about 5 to 10 acres.

Typically, the Barbourville soil has a dark brown loam surface layer about 16 inches thick. The subsoil, to a depth of 73 inches, is dark yellowish brown loam in the upper part, dark yellowish brown clay loam in the middle part and dark yellowish brown, mottled, gravelly clay loam in the lower part. The substratum, to a depth of 80 inches, is yellowish brown gravelly loam. In some similar soils, the dark colored topsoil is 7 to 10 inches thick or is somewhat lighter in color.

This soil is medium in natural fertility and high in organic matter content. Permeability is moderately rapid. The available water capacity is moderate. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Cotaco and Pope soils on low stream terraces, small areas of Shelocta soils on footslopes and small areas of Craigsville on flood plains. Cotaco soils are moderately well drained. Shelocta soils lack water-worn pebbles. Pope soils are coarse-loamy and Craigsville soils are loamy-skeletal. These soils make up about 10 percent of the map unit.

Most areas of this soil are used for growing cultivated crops and hay. Some areas are used for pasture.

This soil is well suited to growing cultivated crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are keeping erosion to a minimum and maintaining tilth and fertility. On some areas runoff from adjacent hill slopes can cause gully erosion or can deposit gravel. This runoff can be carried around the field with diversion terraces or across the field in waterways. Terraces, conservation tillage, and crop rotation can be used to reduce erosion. There are no soil limitations to the construction and use of terraces. Crop rotations with about 1 out of 4 years in grass or legume meadow are needed to control erosion on most areas. Conservation tillage can be used to grow

continuous crops on many areas without excessive erosion. Conservation tillage and the use of cover crops help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to grasses and legumes. Species such as tall fescue and lespedeza are tolerant of acid, infertile subsoil conditions and are best suited. However, with adequate lime and fertilizer good yields can be obtained from most forage species. Pasture management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction, loss of stand, and excessive runoff. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture in good condition.

This soil is well suited to growing trees. Productivity is moderate. Plant competition is the major soil management concern. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and the use of herbicides or cutting.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

This soil is suited to building site development. Slope is a limitation for commercial buildings. In places, where depth to bedrock is less than 72 inches, soil depth is a limitation for conventional septic tank absorption fields.

This soil is in capability subclass IIe.

Bo—Bonnie silt loam, occasionally flooded

This very deep, poorly drained, nearly level soil is on flood plains along small streams. Slopes are smooth and range from 0 to 1 percent. Most areas of this soil are nearly oval in shape and range from about 6 to 40 acres.

Typically, the Bonnie soil has a dark gray silt loam surface to about 9 inches. The subsoil is light brownish gray and yellowish brown silt loam to a depth of 13 inches. The substratum, to a depth of 48 inches, is gray silt loam with brown mottles; and from 48 to 80 inches is gray silt loam with brown mottles. In some similar soils, the underlying material is moderately acid or slightly acid. Other similar soils contain 15 to 30 percent fine and medium sand. Other similar soils have silty clay loam B horizons with few faint clay films on faces of peds.

This soil is medium in natural fertility and low in organic matter content. Permeability is moderately slow. The available water capacity is high. The number of roots decreases gradually with depth and there are generally few roots below about 6 inches. Flooding on most areas is occasional with the flooding interval ranging from about 5 to 50 times in 100 years. These floods are of brief duration. A water table is often present during the winter and spring at a depth of less than one foot. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Craigsville, Philo, Pope, Stendal, and Stokly soils. Philo soils are moderately well drained and occur throughout the unit. Stendal and Stokly soils are somewhat poorly drained. Pope soils are well drained and occur on flood plains. Craigsville soils are well drained and are on flood plains and low stream terraces. These soils make up about 15 percent of the map unit.

Most areas of this soil are used for growing pasture and hay. Many areas once cleared and pastured, have reverted to woodland.

The areas of this soil that have been adequately drained are suited to growing cultivated crops such as corn and tobacco. On areas that have not been drained, this soil generally is unsuited to growing cultivated crops. Even with drainage, this soil commonly is too wet to plow for long periods of time in the late winter and spring, than other soils in the area. Late plantings are common. Other soil management concerns are flooding and maintaining tilth and fertility. Flooding is of brief duration and occurs in the late winter or early spring. Where summer crops such as corn are grown, this flooding generally does not interfere with farming operations or damage the crop. This soil has good tilth. Conservation tillage, and the use of cover crops, lime, and fertilizer help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is suited to grasses and legumes. Species such as tall fescue, reed canarygrass, big bluestem, and Ladino clover are tolerant of wet soils and can be grown. Reed canarygrass is exceptionally well suited on the wettest areas as it is tolerant of standing water. Both tall fescue and reed canarygrass form a sod firm

enough on these soils for cattle to graze without excessive miring. Other management concerns are preventing overgrazing and maintaining a good stand. Overgrazing weakens the stand and allows undesirable plants to grow. Rushes and sedges are common on overgrazed areas as well as unimproved areas. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture and soil in good condition.

This soil is suited to growing trees. Productivity is moderate. An average stand of pin oak growing on this soil typically would reach a height of about 90 feet in 50 years under fully stocked, unmanaged conditions. Stands of black alder and black willow are common on unmanaged wooded areas. The main soil management concerns are equipment limitations, windthrow hazard, and plant competition. Seedling mortality can be high due to the standing water in some places. Reinforcement plantings can be made until a desired stand is obtained or the soil can be ridged and the seedlings planted on the ridges. Excessive rutting or miring can occur on this soil when the soil is wet. Use of equipment on this soil can be delayed until the soil is dry and gravel or other suitable material can be added to the main logging roads to reduce rutting and miring. In places, roads can be located on nearby soils that are less prone to rutting and miring. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by site preparation and planting. The windthrow hazard is due to the high water table. The stand can be thinned less intensively and more frequently than the stands in areas where the windthrow is slight.

Wetland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, and places to nest or den.

This soil generally is unsuited to building site development due to occasional flooding. Following guidelines and restrictions for building in a flood-prone area may reduce this hazard. In addition, wetness is a severe limitation.

This soil is in capability subclass Vw (undrained) or IIw (drained).

Ca—Cotaco loam, rarely flooded

This very deep, moderately well drained, nearly level soil is on stream terraces and alluvial fans. Slopes are smooth and range from 0 to 2 percent. Most areas are oval and range from about 5 to 10 acres.

Typically, the Cotaco soil has a dark grayish brown loam surface layer about 17 inches thick. The subsoil, is a brown loam to a depth of 25 inches and light olive brown clay loam to a depth of 60 inches. The substratum is light olive brown sandy clay loam to a depth of 67 inches and yellowish brown sandy clay loam to a depth of 80 inches or more. Some similar soils contain small amounts of fine sand to gravel size particles.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The available water capacity is high. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. A water table is often present during the winter and spring at a depth of 1.5 to 2.5 feet. Flooding on most areas is rare, with the flooding interval ranging from about 1 to 5 times in 100 years. These floods are of brief duration. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Allegheny soil on similar landscapes, Craigsville and Pope soils on low steam terraces, and small areas of Shelocta soils on footslopes. Allegheny, Craigsville, Pope, and Shelocta soils are all well drained. These soils make up about 10 percent of the map unit.

Most areas of this soil are used for growing cultivated crops and hay. Some areas are used for pasture. A few areas that were once cleared and used for farming have reverted to woodland.

This soil is well suited to cultivated crops such as corn or tobacco, as well as the commonly grown garden crops. Soil management concerns are wetness and maintaining tilth and fertility. This soil is saturated near the surface for periods of a few days during the winter and spring. On some areas runoff from adjacent hill slopes can cause gully erosion or deposit gravel. This runoff can be carried around the field with diversion terraces or across the field in waterways. This soil has good tilth and can be worked throughout a wide range of moisture conditions. The soil below the normal tillage zone is susceptible to compaction. Conservation tillage and the use of cover crops, lime, and fertilizer help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to pasture and hay. Soil management concerns are wetness and low fertility. This soil is saturated near the surface for periods of a few days during the winter and spring. Species such as tall fescue and lespedeza are tolerant of acid, infertile subsoil conditions and are best suited. However, with adequate lime and fertilizer good

yields can be obtained from most forage species. Other management concerns are preventing overgrazing and maintaining a good stand. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture and soil in good condition.

This soil is well suited to growing trees. Productivity is moderate. An average stand of yellow-popular growing on this soil typically would reach a height of about 95 feet in 50 years under fully stocked unmanaged conditions. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

This soil generally is unsuited to building site development due to rare flooding. Following guidelines and restrictions for building in a flood-prone area may reduce this hazard. In addition, wetness is a moderate or severe limitation for most kinds of building site development and sanitary facilities.

This soil is in capability subclass IIw.

CoB—Cottonbend loam, 2 to 6 percent slopes

This very deep, well drained, gently sloping soil is on high stream terraces. Most areas are irregular in shape and range from about 8 to 30 acres.

Typically, the Cottonbend soil has a brown loam surface layer about 8 inches thick. The subsoil, to a depth of 52 inches, is yellowish brown loam in the upper part, brownish yellow and yellowish brown clay loam in the middle part, yellowish brown clay in the lower part. To a depth of 70 inches the subsoil is yellowish brown and red clay loam. The substratum is yellowish red and reddish yellow sandy clay loam.

This soil is low in natural fertility and low in organic matter content. Permeability is moderate. The available water capacity is high. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. The depth to bedrock is 72 inches or more.

Contrasting inclusions in this map unit are small areas of moderately deep, loamy soils on similar landscapes and small areas of Lonewood soils on structural benches. These soils make up about 10 percent of the map unit.

Most areas of this soil are used for growing cultivated crops and hay. Some areas are used for pasture. A few areas that were once cleared and used for farming have reverted to woodland.

This soil is well suited to growing cultivated crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are keeping erosion to a minimum and maintaining tilth and fertility. On some areas runoff from adjacent hill slopes can cause gully erosion or can deposit gravel. This runoff can be carried around the field with diversion terraces or across the field in waterways. Terraces, conservation tillage, and crop rotation can be used to reduce erosion. There are no soil limitations to the construction and use of terraces. Crop rotations with about 1 out of 4 years in grass or legume meadow are needed to control erosion on most areas. Conservation tillage can be used to grow continuous crops on many areas. Conservation tillage and the use of cover crops help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to grasses and legumes. Species such as tall fescue and lespedeza are tolerant of acid, infertile subsoil conditions and are best suited. However, with adequate lime and fertilizer good yields can be obtained from most forage species. Pasture management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction, loss of stand, and excessive runoff. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture in good condition.

This soil is well suited to growing trees. Productivity is moderate. An average stand of northern red oak growing on this site typically would reach a height of about 78 feet in 50 years under fully stocked, unmanaged conditions. Trees commonly found growing on this soil are yellow-poplar, sweetgum, and white oak. Plant competition is the major soil management concern. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover,

water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

This soil is suited to building site development. There are no soil limitations for dwellings or commercial buildings. In places, where depth to bedrock is less than 72 inches, soil depth is a limitation for conventional septic tank absorption fields.

The Cottonbend soil is in capability subclass IIe.

Cr—Craigsville-Philo complex, 0 to 3 percent slopes, rarely flooded

These very deep, well drained, and moderately well drained, nearly level soils are on flood plains and low stream terraces. Most areas are nearly oval in shape and range from about 6 to 60 acres.

On a typical area the composition is: Craigsville soils 55 percent; Philo soils 30 percent; and contrasting inclusions 15 percent. These soils are so intermingled that they can not be separated at the scale selected for mapping.

Typically, the Craigsville soil has a dark yellowish brown sandy loam surface layer about 8 inches thick. The subsoil, to a depth of 26 inches, is yellowish brown gravelly sandy loam. The substratum, to a depth of 65 inches, is yellowish brown extremely gravelly loamy sand and yellowish brown extremely gravelly sandy loam. Some similar soils have sandy textures in the substratum. Other similar soils contain few rock fragments in the surface layer.

Typically, the Philo soil has a dark grayish brown fine sandy loam surface layer about 7 inches thick. The subsoil, to a depth of 44 inches, is yellowish brown fine sandy loam in the upper part, yellowish brown, mottled, fine sandy loam in the middle part, and light brownish gray, mottled, sandy loam in the lower part. The substratum is yellowish brown and light brownish gray, mottled sandy loam. Some similar soils have a substratum that is moderately acid or slightly acid or the subsoil is not mottled to a depth of about 30 inches or both.

These soils are low in natural fertility and moderate in organic matter content. Permeability is moderately rapid and rapid in the Craigsville soil and moderate in the Philo soil. The available water capacity is very low in the Craigsville soil and moderate to high in the Philo soil. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. During the winter and spring months a water table is present at a depth of 1.5 to 3.0 feet in the Philo soil and at a depth of more than 4 feet in the Craigsville soil. Flooding on most areas is rare, with the flooding interval ranging from about 1 to 5 times in 100 years. These floods are of brief duration. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Bonnie, Pope, and Stokly soils on similar landscapes. Bonnie soil is poorly drained and commonly occurs as small seeps or ponded areas. Pope soil is well drained and coarse-loamy. Stokly is somewhat poorly drained and coarse-loamy. Small areas of Allegheny, Barbourville, Cotaco, and Shelocta soils occur on alluvial fans, stream terraces, or footslopes. These soils make up about 15 percent of the map unit.

Most areas of these soils are used for growing pasture and hay. Some areas are used for growing corn and garden crops. A few areas that were once cleared and used for farming have reverted to woodland.

These soils are suited to crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are susceptibility to compaction and maintaining tilth and fertility. Some areas are subject to scour and deposition caused by runoff from adjacent hill slopes. This runoff can be carried around the field with diversion terraces or across the field in waterways. These soils have good tilth. In places, the Craigsville soil contains excessive gravel in the plow layer. Conservation tillage and the use of cover crops, lime, and fertilizer help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

These soils are well suited to grasses and legumes. Maintaining fertility and the hazard of flooding are the main soil management concerns. Other management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction, loss of stand, and excessive runoff. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture and soil in good condition.

These soils are suited to growing trees. Productivity is high. An average stand of yellow-poplar growing on the Craigsville soil typically would reach a height of about 95 feet in 50 years under fully stocked, unmanaged conditions. Some of the more common species are green ash, red maple, American sycamore, and American elm. The main soil

management concern is plant competition. Plant competition from the growth of undesirable species can be a problem, particularly on the Philo soil, due to the very favorable site conditions. A new forest crop can be established by clearing and disking, using herbicides, or by managing the existing stand.

Openland wildlife habitat potential is fair to good and can be maintained and improved by providing food, cover, and places to nest or den. Field borders create natural wildlife areas. Trees and brush along the stream provide benefits to wildlife as well as erosion control. Brush piles or other nesting structures can be built.

These soils generally are unsuited to building site development due to rare flooding. Following guidelines and restrictions for building in a flood-prone area may reduce this hazard.

The Craigsville soil is in capability subclass IIIs and the Philo soil is in capability subclass IIw.

Dm—Dumps, mine; tailings; and tipples

This map unit consists of residue from coal mining. The mine dumps or "gob piles" are heaps of coal that contain too many impurities to be of commercial value. Commonly the heaps are steep, flat-topped hills about 100 feet in height. The tailings are finely pulverized coal and shale material that is washed from the mined coal during preparation and then deposited in basins or tailings ponds. Tipples are coal loading areas and contain large piles of coal along with coal loading and storage facilities. Commonly each miscellaneous area is large enough to map separately, but because of present and predicted use, they were mapped as one unit. Most delineations contain each of these miscellaneous areas, but many contain two or only one of these areas. These areas generally lack vegetation and do not show any alteration of the material by soil-forming processes. Most areas are nearly oval and range from about 8 to 80 acres.

The mine dumps commonly are very dark grayish brown or black channers. The rock fragments commonly range from 75 to 95 percent by volume. The smaller pieces grade to sand-size particles and the larger pieces are as much as 6 inches across. These areas also include heaps of "red dog" or residue from impure coal that has burned.

The tailings are a sand-size, black material that is largely finely pulverized coal. It is washed from coal and is allowed to settle in basins. Most of the material would pass a 100-mesh screen.

The tipples are coal loading areas and contain large piles of coal along with facilities for coal processing, loading, and storage (fig. 6). Buildings and parking areas are also included.

The natural fertility and the organic matter content are very low. Permeability is rapid. The available water capacity is very low. The reaction is extremely acid to moderately acid. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Bethesda, Bonnie, Fairpoint, and Stokly soils, as well as other soils that formed in loamy fill materials. These included soils make up about 15 percent of the map unit.

These areas generally are barren or support a sparse growth of grasses, forbs, brambles, and small trees. Presently, there is no commercial use for the mine dumps and tailings.

Where the establishment of vegetation on these materials is desired, the main soil limitations are high acidity, droughtiness, very low fertility levels, and in places, either large volume of rock fragments in the surface layer or steep slopes or both. The steep slopes can be smoothed. Lime and fertilizer can be added. These practices along with mulching and the

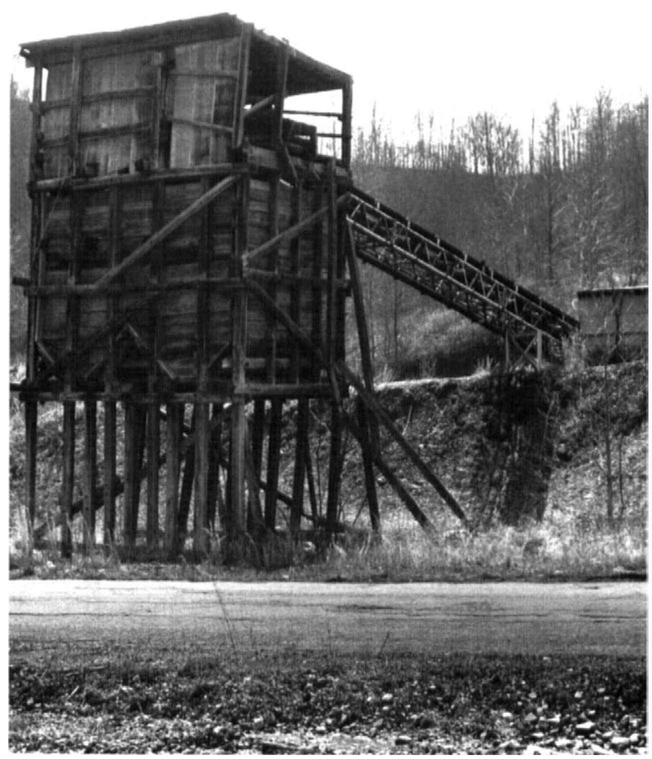

Figure 6.—A coal tipple in an area of Dumps, mine; tailings; and tipples. It is used to load trucks and railcars when coal is transported to processing plants.

selection of species suited to growing on acid, droughty areas can help to establish a vegetative cover. On some areas these materials can be topsoiled with a soil material that is better suited to the establishment and maintenance of a vegetative cover.

These miscellaneous areas are in capability subclass VIIs.

FbC—Fairpoint and Bethesda soils, 2 to 20 percent slopes

These very deep, well drained, gently sloping to moderately steep soils are on ridgetops, structural benches, side slopes, hollow fills, and stream terraces. Most areas of these soils are due to surface mining of coal. Some areas formed as a result of highway construction or other extensive earth moving operations. Most areas are long and narrow or are irregular in shape. Most areas range from 6 to 200 acres.

In a typical area the composition is as follows: Fairpoint or Bethesda soil or both, 90 percent and contrasting inclusions 10 percent. Individual areas of each soil are large enough to map separately, but because of the present and predicted use, they were mapped as one unit. Many areas contain both soils, but some areas contain only one of the soils.

Typically, the Fairpoint soil has a yellowish brown channery silty clay loam surface layer about 11 inches thick. The substratum, to a depth of 80 inches, is dark yellowish brown and brownish yellow very channery or extremely channery silty clay loam. Similar soils contain 15 to 35 percent rock fragments in the substratum and some contain more clay in the surface layer.

Typically, the Bethesda soil has an olive brown channery silt loam surface horizon about 4 inches thick. The subsurface horizon is dark olive brown channery silt loam about 4 inches thick. The substratum, to a depth of 80 inches, is olive gray and dark gray very channery silty clay loam in the upper part, and variegated dark gray, olive gray and strong brown extremely channery silty clay loam in the lower part. Some similar soils contain 15 to 35 percent rock fragments in the substratum.

Both Fairpoint and Bethesda soils are low in natural fertility. The organic matter content in these soils is low. Permeability is moderately slow. The available water capacity is moderate. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of undisturbed Shelocta, Gilpin, Cloverlick, Kimper, and Highsplint soils. Included in surface mined areas are similar soils with more clay in the surface horizon, shallow, loamy soils; ponded or seeps areas; and soils with a pH of 3.0 to 3.6. Also included are small areas, found on nearly level flood plains, consisting of 24 inches loamy soil materials over the stony regolith from the surface mining of coal. In places, small miscellaneous areas also occur. These include rock escarpments, mine dumps, water, and gullied areas where runoff concentrates. The included soils make up about 8 percent and the miscellaneous areas make up about 2 percent of the map unit.

Most areas of these soils have been smoothed and seeded to various grasses, legumes, and trees. Some areas are used for pasture.

These soils generally are unsuited to growing cultivated crops such as corn and tobacco. The main limitations are the hazard of erosion, rock fragments in the surface layer, and compacted layers in the subsoil.

These soils are suited to grasses and legumes, however establishment may be difficult. Species that are drought hardy and tolerant of a wide range of soil acidity are best suited. Tall fescue and sericea lespedeza have been used successfully. On most areas the soil pH ranges from 4.8 to 6.5. In places, the pH may be as low as 3.6 or as high as 7.5. Where a higher pH is desired, lime can be added. Most areas require 2 to 5 tons of lime to raise the pH to about 6.5. The actual amount is determined by soil test and the quality of the lime. The soil test level for phosphorus generally is very low and this nutrient commonly is needed for successful seeding. Potassium levels generally are low or medium and commonly are adequate for cover mixtures. Other limitations for growing grasses and legumes are compacted layers and a high content of rock fragments.

These soils are suited to growing trees. The productivity is moderate. An average stand of loblolly pine growing on the Fairpoint soil typically would reach a height of about 74 feet in 50 years under fully stocked, unmanaged conditions. On the Bethesda soil a similar stand would reach a height of 69 feet. Seedling mortality and plant competition are the main soil management concerns. Soil erosion usually is associated with the establishment of a vegetative cover. Herbaceous species can be seeded along with the tree species to help provide erosion control. Mulching with straw or processed wood fiber can also be used. On many areas the seed, fertilizer, and

mulch are applied as a slurry. Tree species for seeding are black locust, eastern white pine, loblolly pine, and white oak.

Openland wildlife habitat potential is fair, but can be maintained and improved by providing food, cover, water, and places to nest or den. Tree and shrub rows can break up large open areas. Grass and legume mixtures suitable for food and cover can be planted. Areas that produce native plants can be improved by disking and fertilizing. Shallow water areas can be created in permanent water areas and depressions can hold seasonal pools. Brush piles or other nesting structures can be built.

These soils generally are unsuited to urban development because of the hazard of uneven settling, steep slopes, slides, or slumps. However, on the less sloping areas these limitations can generally be overcome with proper engineering and geotechnical design (fig. 7).

These soils are in capability subclass VIs.

FbF—Fairpoint and Bethesda soils, 20 to 70 percent slopes

These very deep, well drained, steep to very steep soils are on ridgetops, structural benches, side slopes, hollow fills, and stream terraces. Most areas of these soils are due to surface mining of coal. Some areas formed as result of highway construction or other extensive earth moving operations. The dominant slopes are 20 to 70 percent, but many areas have a narrow bench where the slopes are 0 to 20 percent. Most areas are long and narrow or are irregular in shape. Most areas range from 10 to 200 acres.

In a typical area the composition is: either Fairpoint or Bethesda soil or both 80 percent, and contrasting

Figure 7.—An area of Fairpoint and Bethesda soils, 2 to 20 percent slopes. This area is being developed for homesites. Although these soils are considered unsuitable for urban development because of the uneven settling and sliding, proper engineering and geotechnical design can minimize these limitations.

inclusions 20 percent. Individual areas of each soil are large enough to map separately, but because of the present and predicted use, they were mapped as one unit. Many areas contain both soils, but some areas contain only one of the soils.

Typically, the Fairpoint soil has a yellowish brown channery silty clay loam surface layer about 11 inches thick. The substratum, to a depth of 80 inches, is dark yellowish brown and brownish yellow very channery or extremely channery silty clay loam. Similar soils contain 15 to 35 percent rock fragments in the substratum and some contain more clay in the surface layer.

Typically, the Bethesda soil has a olive brown channery silt loam surface layer about 4 inches thick. The subsurface horizon is dark olive brown channery silt loam about 4 inches thick. The substratum, to a depth of 80 inches, is olive gray very channery silty clay loam in the upper part and variegated dark gray, olive gray and strong brown extremely channery silty clay loam in the lower part. Some similar soils contain 15 to 35 percent rock fragments in the substratum.

Both Fairpoint and Bethesda soils are low in natural fertility. The organic matter content in these soils is low. Permeability is moderately slow. The available water capacity is moderate. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of undisturbed Shelocta, Gilpin, Cloverlick, Kimper, and Highsplint soils. Included in surface mined areas are similar soils with more clay in the surface horizon, shallow, loamy soils; ponded or seeps areas; and soils with a pH of 3.0 to 3.6. Also included are small areas, found on nearly level flood plains, consisting of 24 inches loamy soil materials over the stony regolith from the surface mining of coal. In places, small miscellaneous areas also occur. These areas include rock escarpments (fig. 8), mine dumps, water, and gullied areas where runoff concentrates. The included soils make up about 8 percent and the miscellaneous areas make up about 2 percent of the map unit.

Most areas of these soils have been smoothed and seeded to various grasses, legumes, and trees. A few areas were not planted but have reverted to various grasses, forbs, and trees. A few areas are used for pasture.

These soils generally are unsuited to growing cultivated crops such as corn and tobacco. The main limitations are steep slopes and rock fragments in the surface layer.

These soils are suited to grasses and legumes, however establishment may be difficult. Species that are drought hardy and tolerant of a wide range of soil acidity are best suited. Tall fescue and sericea lespedeza have been used successfully. On most areas the soil pH ranges from 4.8 to 6.5. In places, the pH may be as low as 3.6 or as high as 7.5. Where a higher pH is desired, lime can be added. Most areas require 2 to 5 tons of lime to raise the pH to about 6.5. The actual amount is determined by soil test and the quality of the lime. The soil test level for phosphorus generally is very low and this nutrient commonly is needed for successful seeding. Potassium levels generally are low or medium and commonly are adequate for cover mixtures. Other limitations for growing grasses and legumes are slope, compacted layers, and high content of rock fragments.

These soils are suited to growing trees. The productivity is moderate. An average stand of loblolly pine growing on the Fairpoint soil, typically, on a warm slope, would reach a height of about 74 feet in 50 years under fully stocked, unmanaged conditions. On the Bethesda soil typically, a similar stand would reach a height of 69 feet. The hazard of erosion and equipment limitations are the major soil management concerns. Seedling mortality is an additional concern. Soil erosion usually is associated with the establishment of a vegetative cover or with logging roads and trails. Herbaceous species can be seeded along with the tree species to help provide erosion control. Mulching with straw or processed wood fiber can also be used. Because of the steep slopes the seeding generally is done by hand or specialized equipment. On many slopes the seed, fertilizer, and mulch are applied as a slurry. Tree species for seeding are black locust, eastern white pine, loblolly pine, and white oak.

Openland wildlife habitat potential is very poor, but can be maintained and improved by providing food, cover, water, and places to nest or den. Tree and shrub rows can break up large open areas. Grass and legume mixtures suitable for food and cover can be planted. Areas that produce native plants can be improved by disking and fertilizing. Shallow water areas can be created in permanent water areas and depressions can hold seasonal pools. Brush piles or other nesting structures can be built.

These soils generally are unsuited to urban development because of steep and very steep slopes and the hazard of uneven settling, slides, or slumps. These soils are rated severe for slippage; meaning they are susceptible to downslope movement when loaded, excavated, or wet.

These soils are in capability subclass VIIe.

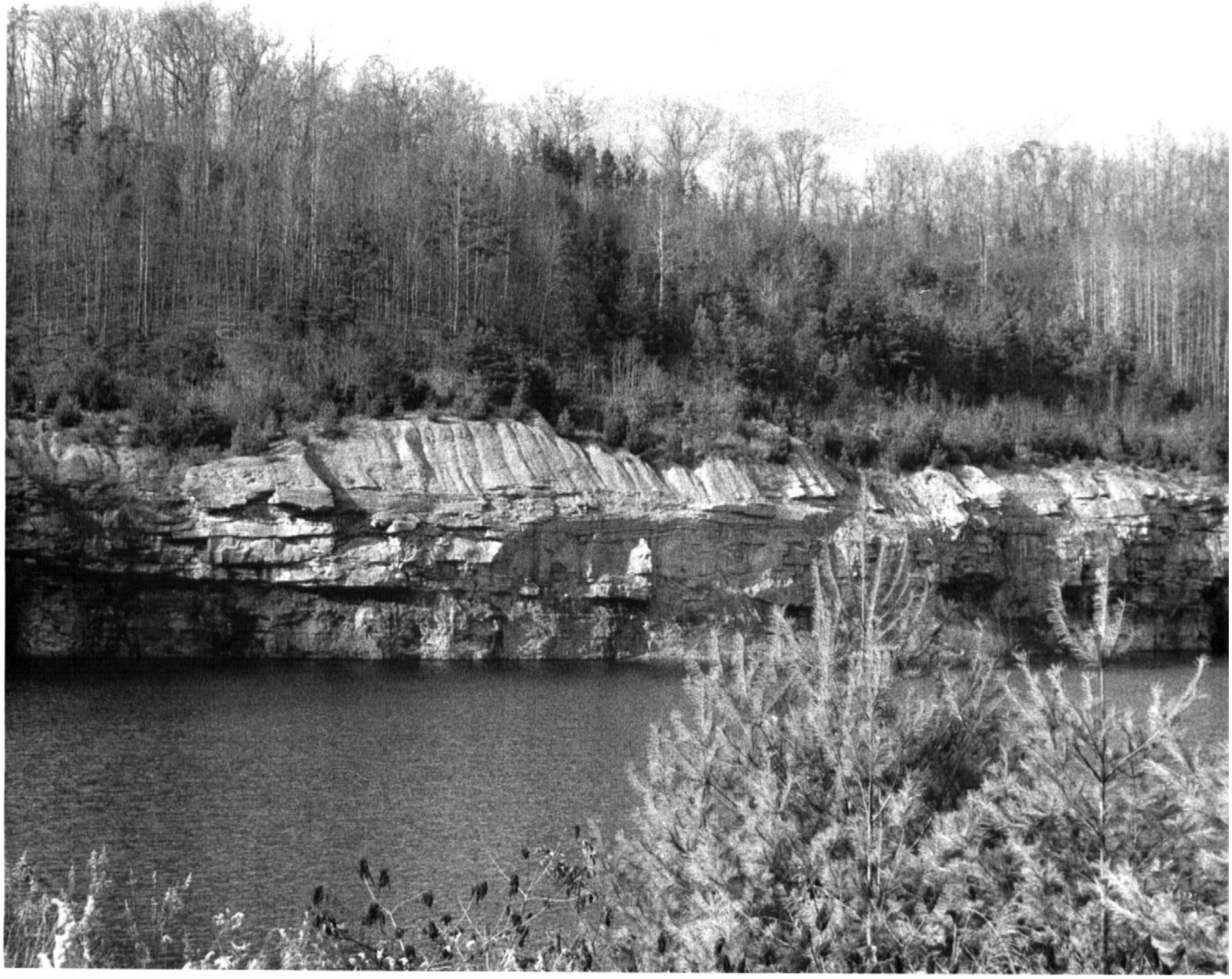

Figure 8.—A rock escarpment and pond in an area of Fairpoint and Bethesda soils, 20 to 70 percent slopes. Rock outcrop is an inclusion in areas that have been disturbed primarily by surface mining for coal.

GhF—Gilpin-Highsplint complex, rocky, 60 to 100 percent slopes

These moderately deep and very deep, well drained, very steep soils are on side slopes of hills. Slopes generally range from 60 to 85 percent for the Gilpin and Highsplint soils and up to 100 percent for the areas of rock outcrop. The elevations range from about 1,800 feet near the hill crest to about 800 feet along the base of the hill. The shape of the slope down the side of the hill is nearly linear, but is broken by small cliffs and benches. Across the hill, the slope is slightly corrugated. Small streams within the shallow grooves commonly begin near the ridge crest and run to about the base of the hill before joining other streams. In most places, these small streams are spaced about 150 to 300 feet apart. Lying between these streams are ribs with irregular slopes. Areas of rock outcrop are on many of these ribs and these along with the cliffs, make up about 2 to 5 percent of this unit. Stones and boulders cover less than 3 percent of the surface on most areas. Most areas of this complex are crescent shaped and range from about 15 to 60 acres.

On a typical area the composition is: Gilpin and similar soils 45 percent; Highsplint and similar soils 22 percent; rock outcrop 3 percent, and contrasting inclusions 30 percent. Commonly, the Gilpin soil is on the smoother side slopes. Most areas of the Highsplint soil are below sandstone cliffs and on the

lower slopes. These soils are so intermingled that they can not be separated at the scale selected for mapping.

Typically, the Gilpin soil has a brown and light yellowish brown loam surface layer about 6 inches thick. The subsoil, to a depth of 26 inches, is brownish yellow loam, channery silt loam, and channery silty clay loam. The lower part of the subsoil, to a depth of 30 inches, is strong brown channery loam. Weathered sandstone bedrock is at a depth of 30 inches and hard siltstone bedrock is at a depth of 36 inches. Some similar soils have a thick, multicolored, loamy substratum and a few have as much as 50 percent rock fragments in the lower part of the subsoil.

Typically, the Highsplint soil has a surface layer about 2 inches thick and is yellowish brown channery loam. The subsoil, to a depth of 51 inches, is yellowish brown channery and very flaggy loam in the upper part and is yellowish brown mottled very flaggy loam in the lower part. The substratum, to a depth of 80 inches, is yellowish brown mottled extremely flaggy sandy clay loam.

These soils are low in natural fertility and moderate in organic matter content. The available water capacity is moderate. Permeability is moderate in the Gilpin soil and moderately rapid in the Highsplint soil. The number of roots decreases gradually with depth in the Gilpin and Highsplint soils, and there are few roots below about 18 inches. The depth to bedrock is 20 to 40 inches in the Gilpin soil and 60 inches or more in the Highsplint soil.

Contrasting inclusions in this map unit are areas of Shelocta, Kimper, and Cloverlick soils. Cloverlick and Kimper soils occur on small areas of the cool slopes of knobs and upper side slopes. A soil similar to Gilpin with a thick, dark surface layer also occurs on cool side slopes. Altogether these soils make up about 30 percent of this complex. A few very small areas of rock outcrops also occur and make up about 3 percent of this complex.

Most areas of these soils are in woodland.

These soils are suited to growing trees. Productivity is moderate. An average stand of white oak growing on the cool slope of a Gilpin soil would reach a height of about 75 feet in 50 years under fully stocked, unmanaged conditions. Mixed oak forest predominate. Some of the more common tree species are chestnut oak, black oak, scarlet oak, red maple, white oak, and various hickories. In places, these species are mixed with sugar maple, American beech, northern red oak, pitch pine, and black gum. Common understory plants include mountain laurel, sassafras, flowering dogwood, American hornbeam, and greenbriers. The herbaceous flora is variable and numerous species are found.

The hazard of erosion and equipment limitations, are the major soil management concerns. Soil erosion usually is associated with haul roads and skid trails. To help reduce erosion, a grade of less than 10 percent can be used for roads and trails, and the area of soil disturbance can be kept to 10 percent or less. Permanent access roads can be protected by using water bars, culverts and gravel. Because of the very steep slopes, crawler tractors or other specialized equipment generally is needed. Logs can be yarded to roads and trails located on the contour or to nearby, less sloping areas. Planting can be done by hand or direct seeding. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Woodland wildlife habitat potential is poor to good, but can be maintained and improved by providing food, cover, and places to nest or den. Brushy thickets can be established by clearing small areas in large tracts of mature woodland. Food plots or green browse areas can be planted along logging roads and trails. Areas that produce native plants can be improved by disking and fertilizing. Den trees can be left and brush piles or other nesting structures can be built.

These soils generally are unsuitable for cultivated crops, pasture, and building site development due to the very steep slopes. These soils are rated severe for slippage; meaning they are susceptible to downslope movement when loaded, excavated, or wet.

These soils are in capability subclass VIIe.

GIC2—Gilpin-Shelocta complex, 3 to 12 percent slopes, eroded

These moderately deep and deep, well drained, gently sloping and sloping soils are on ridgetops and upper side slopes. The elevations range from about 800 to 1,400 feet. Some areas with an elevation of about 1,400 to 1,650 feet are on rounded ridgetops. The shape of the slope commonly is irregular. Most areas of this complex are irregular in shape and range from about 5 to 30 acres.

On a typical area the composition is: Gilpin and similar soils 45 percent; Shelocta and similar soils 40 percent; and contrasting inclusions 15 percent. Most

areas of the Gilpin soil are on the small ridgetops. Commonly, the Shelocta is on side slopes. These soils are so intermingled that they can not be separated at the scale selected for mapping.

Typically, the Gilpin soil has a brown and light yellowish brown loam surface layer about 6 inches thick. The subsoil, to a depth of 26 inches, is brownish yellow loam, channery silt loam, and channery silty clay loam. The lower part of the subsoil, to a depth of 30 inches, is strong brown channery loam. Weathered sandstone bedrock is at a depth of 30 inches and hard siltstone bedrock is at a depth of 36 inches. Some similar soils have a thick, multicolored, loamy substratum and a few have as much as 50 percent rock fragments in the lower part of the subsoil.

Typically, the Shelocta soil has a surface layer that is brown gravelly silt loam about 3 inches thick and a subsurface of dark yellowish brown silt loam about 7 inches thick. The subsoil, to a depth of 20 inches, is yellowish brown silty clay loam and from 20 to 45 inches is yellowish brown channery silty clay loam. Weathered gray shale occurs from 45 to 55 inches.

These soils are low in natural fertility and moderate in organic matter content. The available water capacity is moderate in the Gilpin soil and high in the Shelocta soil. Permeability is moderate. The number of roots decreases gradually with depth and there are few roots below about 18 inches. The depth to bedrock is 20 to 40 inches in the Gilpin soil and 40 to 60 inches in the Shelocta soil.

Contrasting inclusions in this map unit are small areas of Lonewood and Sequoia soils and shallow, loamy soils. Lonewood soils are very deep. Sequoia soils are clayey. These soils make up about 15 percent of this complex. A few very small areas of rock outcrop also occur, but make up less than 1 percent of this complex.

Most areas of these soils are cleared and used for pasture, growing hay and other crops, and building sites. A few areas, once cleared, have reverted to woodland.

These soils are suited to growing crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are keeping erosion to a minimum and maintaining tilth and fertility. Terraces, conservation tillage, and crop rotation can be used to reduce erosion. Terraces are not practical in some fields due to the irregular slopes. Where terraces are used, the depth of cut and design of the terrace system must be weighed against exposing small, infertile areas and the benefits of reducing soil erosion. Crop rotations with about 3 out of 4 years in grass or legume meadow are needed to control erosion on most areas. Conservation tillage can be used to increase the number of years of cultivated crops in rotation. Conservation tillage and the use of cover crops help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

These soils are suited to grasses and legumes. Species such as tall fescue and lespedeza, which are tolerant of acid, infertile subsoil conditions are best suited; however, with adequate lime and fertilizer good yields can be obtained from most forage species. Pasture management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction, loss of stand, and excessive runoff. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture in good condition.

These soils are suited to growing trees. Productivity is moderate. An average stand of white oak growing on these soils typically, would reach a height of about 75 feet in 50 years under fully stocked, unmanaged conditions. Many old fields have reverted to white oak, yellow-poplar, and red maple, or were planted to pine. Plant competition is the main soil management concern. Growth from undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by clearing and disking, using herbicides or by managing the existing stand.

Openland wildlife habitat potential is good and can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

These soils are unsuited to building sites unless sewer facilities are available. Depth to bedrock is a limitation for dwellings with basements. Leveling is needed to modify the slope for dwellings. Conventional septic tank absorption fields generally are unsuited because of the depth to bedrock. Other systems such as a mound system may provide adequate waste water treatment. The slope affects the ease of excavation and grading of local roads and streets. The low strength affects traffic supporting capacity. Crushed rock or other suitable material can

be added to form a more suitable base for roads and streets.

The land capability subclass is IIIe.

GlD2—Gilpin-Shelocta complex, 12 to 20 percent slopes, eroded

These moderately deep and deep, well drained, moderately steep soils are on ridgetops and upper side slopes. On most areas the elevations range from about 800 to 1,400 feet. Some areas with an elevation of about 1,400 to 1,650 feet are on rounded ridgetops. The shape of the slope commonly is irregular. Most areas of this complex are irregular in shape and range from about 10 to 80 acres.

On a typical area the composition is: Gilpin and similar soils 45 percent; Shelocta and similar soils 40 percent; and contrasting inclusions 15 percent. Most areas of the Gilpin soil are on the small ridgetops. Commonly the Shelocta soil is on side slopes. These soils are so intermingled that they can not be separated at the scale selected for mapping.

Typically, the Gilpin soil has a brown and light yellowish brown loam surface layer about 6 inches thick. The subsoil, to a depth of 26 inches, is brownish yellow loam, channery silt loam, and channery silty clay loam. The lower part of the subsoil, to a depth of 30 inches, is strong brown channery loam. Weathered sandstone bedrock is at a depth of 30 inches and hard siltstone bedrock is at a depth of 36 inches. Some similar soils have a thick, multicolored, loamy substratum and a few have as much as 50 percent rock fragments in the lower part of the subsoil.

Typically, the Shelocta soil has a surface layer that is brown gravelly silt loam about 3 inches thick and a subsurface of dark yellowish brown silt loam about 7 inches thick. The subsoil, to a depth of 20 inches, is yellowish brown silty clay loam and from 20 to 45 inches is yellowish brown channery silty clay loam. Weathered gray shale occurs from 45 to 55 inches.

These soils are low in natural fertility and moderate in organic matter content. The available water capacity is moderate in the Gilpin soil and high in the Shelocta soil. Permeability is moderate. The number of roots decreases gradually with depth and there are few roots below about 18 inches. The depth to bedrock is 20 to 40 inches in the Gilpin soil and 40 to 60 inches or more in the Shelocta soil.

Contrasting inclusions in this map unit are small areas of Lonewood and Sequoia soils or shallow, loamy soils. Lonewood soils are very deep. Sequoia soils are clayey. These soils make up about 15 percent of this complex. A few very small areas of rock outcrop also occur, but make up less than 1 percent of this complex.

Most areas of these soils are in pasture. Many areas, once cleared and used for farming, have reverted to woodland. A few areas are used for cultivated crops and gardens.

These soils are poorly suited to growing cultivated crops such as corn and tobacco, unless intensive erosion control measures are used. Other soil management concerns are susceptibility to compaction and maintaining tilth and fertility.

These soils are suited to grasses and legumes. Species such as tall fescue and lespedeza, which are tolerant of acid, infertile subsoil conditions are best suited; however, with adequate lime and fertilizer good yields can be obtained from most forage species. Pasture management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction, loss of stand, and excessive runoff. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture in good condition.

These soils are suited to growing trees. Productivity is moderate. Most old fields have stands of white oak, yellow-poplar, and red maple or were planted to eastern white pine or Virginia pine. The hazard of erosion, equipment limitations, and plant competition are the major soil management concerns. Soil erosion usually is associated with haul roads and skid trails. Where crawler tractors are used, as much as 10 percent of the area can be disturbed. To help reduce erosion, a grade of less than 10 percent can be used for roads and trails and the area of soil disturbance can be kept to 10 percent or less. Permanent access roads can be protected by using water bars, culverts, and gravel. Because of the moderately steep slopes, the equipment limitations generally apply only to large specialized harvesting and planting equipment. Slopes, however, are gentle enough so that most commonly used farming equipment and trucks can be operated safely for harvesting and planting. On the small steep areas, logs can be skidded to less sloping areas and planting can be done by hand. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Openland wildlife habitat potential is fair and can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas

and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

These soils generally are unsuited to building sites unless sewer facilities are available. Slope is the main soil limitation for dwellings with or without basements. Leveling is needed to modify the slope for dwellings. Slope and depth to bedrock are limitations for conventional septic tank absorption fields. The slope also affects the ease of excavation and grading of local roads and streets.

These soils are in capability subclass IVe.

GIE2—Gilpin-Shelocta complex, 20 to 35 percent slopes, eroded

These moderately deep and deep, well drained, steep soils are on low hills. On most areas the elevations range from about 800 to 1,400 feet. Some areas with an elevation of about 1,400 to 1,650 feet are on rounded ridgetops. The shape of the slope commonly is irregular. Most areas of this complex are irregular in shape and range from about 10 to 200 acres.

On a typical area the composition is: Gilpin and similar soils 55 percent; Shelocta and similar soils 35 percent; and contrasting inclusions 10 percent. Most areas of the Shelocta soil are on side slopes. Commonly, the Gilpin soil is on the small ridgetops. These soils are so intermingled that they can not be separated at the scale selected for mapping.

Typically, the Gilpin soil has a brown and light yellowish brown loam surface layer about 6 inches thick. The subsoil, to a depth of 26 inches, is brownish yellow loam, channery silt loam and channery silty clay loam. The lower part of the subsoil, to a depth of 30 inches, is strong brown channery loam. Weathered sandstone bedrock is at a depth of 30 inches and hard siltstone bedrock is at a depth of 36 inches. Some similar soils have a thick, multicolored, loamy substratum and a few have as much as 50 percent rock fragments in the lower part of the subsoil.

Typically, the Shelocta soil has a surface layer that is brown gravelly silt loam about 3 inches thick and a subsurface of dark yellowish brown silt loam about 7 inches thick. The subsoil, to a depth of 20 inches, is yellowish brown silty clay loam and from 20 to 45 inches is yellowish brown channery silty clay loam. Weathered gray shale occurs from 45 to 55 inches.

These soils are low in natural fertility and moderate in organic matter content. The available water capacity is moderate in the Gilpin soil and high in the Shelocta soil. Permeability is moderate. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. The depth to bedrock is 20 to 40 inches in the Gilpin soil and 44 to 60 inches in the Shelocta soil.

Contrasting inclusions in this map unit are small areas of Lonewood and Sequoia soil or shallow, loamy soils. Lonewood soils are very deep. Sequoia soils are clayey. These soils make up about 15 percent of this complex. A few, very small areas of rock outcrop also occur, but make up less than 1 percent of this complex.

Most areas of these soils are in pasture. Many areas, once cleared and used for farming, have reverted to woodland. A few areas are used for cultivated crops and gardens.

These soils are suited to grasses and legumes. Species such as tall fescue and lespedeza are tolerant of acid, infertile subsoil conditions and are best suited. However, with adequate lime and fertilizer good yields can be obtained from most forage species. Pasture management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction, loss of stand, and excessive runoff. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture in good condition.

These soils are suited to growing trees. Productivity is moderate. The hazard of erosion, equipment limitations, and plant competition are the major soil management concerns. Soil erosion usually is associated with haul roads and skid trails. Where crawler tractors are used as much as 10 percent of the area can be disturbed. To help reduce erosion, a grade of less than 10 percent can be used for roads and trails and the area of soil disturbance can be kept to 10 percent or less. Permanent access roads can be protected by using water bars, culverts, and gravel. Because of the steep slopes, crawler tractors or other specialized equipment generally is needed. Logs can be yarded to roads and trails located on the contour. Planting can be done by hand or direct seeding. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Woodland and openland wildlife habitat potential is fair to good, but can be maintained and improved by providing food, cover, and places to nest or den. Brushy thickets can be established by clearing small

areas in large tracts of mature woodland. Food plots or green browse areas can be planted along logging roads and trails. Areas that produce native plants can be improved by disking and fertilizing. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Den trees can be left and brush piles or other nesting structures can be built.

These soils generally are unsuited for cultivated crops and building site development due to the steep slopes.

These soils are in capability subclass VIe.

GsF—Gilpin-Shelocta-Sequoia complex, 25 to 55 percent slopes, very stony

These moderately deep and deep, well drained, steep and very steep soils are on ridgetops and upper side slopes of hills. On most areas the elevations range from about 1,200 to 2,000 feet and are about 400 to 800 feet above the valley floor. The shape of the slope commonly is irregular. Stones and boulders cover 0.1 to 10 percent of the surface of most areas. Most areas of this complex are irregular in shape and range from about 15 to 300 acres.

On a typical area the composition is: Gilpin and similar soils 21 percent; Shelocta and similar soils 22 percent; Sequoia and similar soils 15 percent; and contrasting inclusions 40 percent. Commonly the Gilpin and Sequoia soils are on the small ridgetops. Most areas of the Shelocta soil are on side slopes. These soils are so intermingled that they can not be separated at the scale selected for mapping.

Typically, the Gilpin soil has a brown and light yellowish brown loam surface layer about 6 inches thick. The subsoil, to a depth of 26 inches, is brownish yellow loam, channery silt loam and channery silty clay loam. The lower part of the subsoil, to a depth of 30 inches, is strong brown channery loam. Weathered sandstone bedrock is at a depth of 30 inches and hard siltstone bedrock is at a depth of 36 inches. Some similar soils have a thick, multicolored, loamy substratum and a few have as much as 50 percent rock fragments in the lower part of the subsoil.

Typically, the Shelocta soil has a surface layer that is brown gravelly silt loam about 3 inches thick and a subsurface of dark yellowish brown silt loam about 7 inches thick. The subsoil, to a depth of 20 inches, is yellowish brown silty clay loam and from 20 to 45 inches is yellowish brown channery silty clay loam. Weathered gray shale occurs from 45 to 55 inches.

Typically, the Sequoia soil has a dark grayish brown silt loam surface layer about 2 inches thick. The subsoil, to a depth of 23 inches, is strong brown silty clay loam in the upper part and strong brown silty clay in the lower part. Hard siltstone bedrock occurs at 23 inches. Some similar soils have gray mottles in the subsoil that are thought to be inherited from the parent material. Other similar soils have a multi-colored, loamy substratum that extends to about 48 inches.

These soils are low in natural fertility, Gilpin and Shelocta soils are moderate in organic matter content, and the Sequoia soils are low in organic matter content. The available water capacity is moderate in the Gilpin and Sequoia soils and high in the Shelocta soil. Permeability is moderate in the Gilpin and Shelocta soils and moderately slow in the Sequoia soil. The number of roots decreases gradually with depth and there are few roots below about 18 inches. The shrink-swell potential is moderate in the Sequoia soil. The depth to bedrock is 20 to 40 inches in the Gilpin and Sequoia soils and 40 to 60 inches in the Shelocta soil.

Contrasting inclusions in this map unit are areas of shallow and moderately deep, loamy soils. These soils commonly occur on sandstone knobs but can be found throughout this complex. Some of the moderately deep, loamy soils contain large amounts of sandstone cobbles. In other places, small areas of shallow, channery soils are on convex slopes. Cloverlick and Kimper soils occur on small areas of the cool slopes of knobs and upper side slopes. Other loamy soils, either moderately deep or with a thick, dark surface layer or both, also occur on the cool side slopes. Altogether these soils make up about 40 percent of this complex. A few very small areas of rock outcrop also occur, but make up less than 1 percent of this complex.

Most areas of these soils are in woodland. A few areas are used for pasture.

These soils are suited to growing trees. Productivity is moderate. An average stand of chestnut oak growing on these soils typically would reach a height of about 68 feet in 50 years under fully stocked, unmanaged conditions. Mixed oak forest predominate. Some of the more common tree species are chestnut oak, black oak, scarlet oak, red maple, white oak, and various hickories. In places, these species are mixed with sugar maple, American beech, northern red oak, pitch pine, and black gum. Many old fields have reverted to nearly pure stands of Virginia pine or yellow-poplar. Common understory plants include mountain laurel, sassafras, flowering dogwood, American hornbeam, and greenbriers. The

herbaceous flora is sparse, but numerous species are found.

The hazard of erosion, equipment limitations, and plant competition are the major soil management concerns. Soil erosion usually is associated with haul roads and skid trails. To help reduce erosion, a grade of less than 10 percent can be used for roads and trails and the area of soil disturbance can be kept to 10 percent or less. Permanent access roads can be protected by using water bars, culverts, and gravel. Because of the steep slopes, crawler tractors or other specialized equipment generally is needed. Logs can be yarded to roads and trails located on the contour. Planting can be done by hand or direct seeding. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Woodland wildlife habitat potential is fair to good, but can be maintained and improved by providing food, cover, and places to nest or den. Brushy thickets can be established by clearing small areas in large tracts of mature woodland. Food plots or green browse areas can be planted along logging roads and trails. Areas that produce native plants can be improved by disking and fertilizing. Den trees can be left and brush piles or other nesting structures can be built.

These soils generally are unsuitable for cultivated crops, pasture, and building site development due to the steep slopes. These soils are rated severe for slippage; meaning they are susceptible to downslope movement when loaded, excavated, or wet.

These soils are in capability subclass VIIe.

LoB—Lonewood loam, 2 to 6 percent slopes

This deep, well drained, gently sloping soil is on low ridgetops or broad structural benches. Most areas are irregular in shape and range from about 8 to 30 acres.

Typically, the Lonewood soil has a dark yellowish brown loam surface layer about 8 inches thick. The subsoil, to a depth of 44 inches, is yellowish brown and brownish yellow clay loam. The substratum to a depth of 50 inches, is brown clay. Weathered shale bedrock is at a depth of 50 to 54 inches. Shale bedrock is at a depth of 54 inches. In some similar soils, the depth to bedrock is 30 to 40 inches.

This soil is low in natural fertility and low in organic matter content. Permeability is moderate. The available water capacity is high. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. The depth to bedrock is 40 to 60 inches.

Contrasting inclusions in this map unit are small areas of Allegheny and Gilpin soils on high terraces and small areas of Cottonbend soils on structural benches. Some small areas have slopes greater than 12 percent. Gilpin soils are moderately deep. Allegheny soils contain water-worn pebbles and have mixed mineralogy. Cottonbend soils have solums that are greater than 60 inches thick. These soils make up about 15 percent of the map unit.

Most areas of this soil are used for growing cultivated crops and hay. Some areas are used for pasture. A few areas that were once cleared and used for farming have reverted to woodland.

This soil is well suited to growing cultivated crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are keeping erosion to a minimum and maintaining tilth and fertility. On some areas runoff from adjacent hill slopes can cause gully erosion or can deposit gravel. This runoff can be carried around the field with diversion terraces or across the field in waterways. Terraces, conservation tillage, and crop rotation can be used to reduce erosion. There are no soil limitations to the construction and use of terraces. Crop rotations with about 1 out of 4 years in grass or legume meadow are needed to control erosion on most areas. Conservation tillage can be used to grow continuous crops on many areas. Conservation tillage and the use of cover crops help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is suited to grasses and legumes. Species such as tall fescue and lespedeza are tolerant of acid, infertile subsoil conditions and are best suited. However, with adequate lime and fertilizer good yields can be obtained from most forage species. Pasture management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction, loss of stand, and excessive runoff. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture in good condition.

This soil is suited to growing trees. Productivity is moderate. An average stand of white oak growing on these soils would reach a height of about 70 feet in 50 years under fully stocked, unmanaged conditions. Plant competition is the major soil management concern. Plant competition from the growth of undesirable species can be a problem due to the

favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

This soil is suited to building site development. There are no soil limitations for dwellings without basements and commercial buildings. In places where depth to bedrock is less than 72 inches, soil depth is a limitation for conventional septic tank absorption fields.

This soil is in capability subclass IIe.

LoC2—Lonewood loam, 6 to 12 percent slopes, eroded

This deep, well drained, sloping soil is on side slopes or low ridgetops. Generally, this soil has a plow layer that varies in color and texture within the mapped areas. In most places, the plow layer is mixed with the subsoil; some places have little or no mixing; and other places consist mostly of the subsoil. Most areas are irregular in shape and range from about 5 to 25 acres.

Typically, the Lonewood soil has a dark yellowish brown loam surface layer about 8 inches thick. The subsoil, to a depth of 44 inches, is yellowish brown and brownish yellow clay loam. The substratum to a depth of 50 inches, is brown clay. Weathered shale bedrock is at a depth of 50 to 54 inches. Shale bedrock is at a depth of 54 inches. In some similar soils, the depth to bedrock is 30 to 40 inches.

This soil is low in natural fertility and low in organic matter content. Permeability is moderate. The available water capacity is high. The number of roots decreases gradually with depth and there are few roots below about 18 inches. The depth to bedrock is 40 to 60 inches.

Contrasting inclusions in this map unit are small areas of Allegheny and Gilpin soils on high steam terraces and small areas of Cottonbend soils on structural benches. Some small areas have slopes greater than 12 percent. Gilpin soils are moderately deep. Allegheny soils contain water-worn pebbles and have mixed mineralogy. Cottonbend soils have solums that are greater than 60 inches thick. These soils make up about 15 percent of the map unit.

Most areas of this soil are used for pasture and hay. Some areas are used for growing cultivated crops. A few areas that were once cleared and used for farming have reverted to woodland.

This soil is suited to growing cultivated crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are keeping erosion to a minimum and maintaining tilth and fertility. On some areas runoff from adjacent hill slopes can cause gully erosion or can deposit gravel. This runoff can be carried around the field with diversion terraces or across the field in waterways. Terraces, conservation tillage, and crop rotation can be used to reduce erosion. There are no soil limitations to the construction and use of terraces. Crop rotations with about 1 out of 4 years in grass or legume meadow are needed to control erosion on most areas. Conservation tillage can be used to grow continuous crops on many areas. Conservation tillage and the use of cover crops help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is suited to grasses and legumes. Species such as tall fescue and lespedeza are tolerant of acid, infertile subsoil conditions and are best suited. However, with adequate lime and fertilizer good yields can be obtained from most forage species. Pasture management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction, loss of stand, and excessive runoff. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture in good condition.

This soil is suited to growing trees. Productivity is moderate. An average stand of shortleaf pine growing on this soil would reach a height of about 80 feet in 50 years under fully stocked, unmanaged conditions. Trees commonly found growing on this soil are yellow-poplar, sweetgum, and white oak. Plant competition is the major soil management concern. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas

and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

This soil is suited to building site development. Slope is a moderate limitation for dwellings and commercial buildings. Leveling may be needed to modify the slope. Depth to bedrock is a limitation for dwellings with basements. In places, slope, slow permeability, and where depth to bedrock is less than 72 inches, are limitations for conventional septic tank absorption fields.

This soil is in capability subclass IIIe.

Ph—Philo fine sandy loam, rarely flooded

This very deep, moderately well drained, nearly level soil is on low stream terraces along small streams. Slopes range from 0 to 2 percent. Most areas are nearly oval in shape and range from about 6 to 25 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 7 inches thick. The subsoil, to a depth of 44 inches, is yellowish brown fine sandy loam in the upper part, yellowish brown, mottled, fine sandy loam in the middle part and light brownish gray mottled sandy loam in the lower part. The substratum, to a depth of 80 inches, is yellowish brown and light brownish gray mottled sandy loam. In some similar soils, the substratum is medium acid or slightly acid or the subsoil is not mottled to a depth of about 30 inches, or both.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The available water capacity is moderate or high. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. A water table is often present during the winter and spring at a depth of 1.5 to 3 feet. Flooding on most areas is rare, with the flooding interval ranging from about 1 to 5 times in 100 years. These floods are of brief duration. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Bonnie, Craigsville, Pope, Stendal, and Yeager soils on similar landscapes. Bonnie soil is poorly drained and commonly occurs as small seeps or ponded areas. Commonly, the Craigsville soil is on flood plains and low steam terraces. Stendal soils are somewhat poorly drained. Yeager soils are well drained and sandy. These soils make up about 15 percent of the map unit.

Most areas of this soil are used for growing cultivated crops, pasture, and hay. A few areas that were once cleared and used for farming have reverted to woodland.

This soil is well suited to crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are susceptibility to compaction and maintaining tilth and fertility. In places, this soil is too wet to plow for longer periods of time than other soils in the area, due to a seasonal high water table. Surface drainage or tile drainage can be used to help remove excess water. Some areas are subject to scour and deposition caused by runoff from adjacent hill slopes. This runoff can be carried around the field with diversion terraces or across the field in waterways. This soil has good tilth and can be worked throughout a wide range of moisture conditions. Conservation tillage and the use of cover crops, lime, and fertilizer help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to grasses and legumes. Maintaining fertility and the hazard of flooding are the main soil management concerns. Other management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction and loss of stand. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture and soil in good condition.

This soil is well suited to growing trees. Productivity is high. An average stand of yellow-poplar growing on this soil would reach a height of about 102 feet in 50 years under fully stocked, unmanaged conditions. Some of the more common species are green ash, red maple, yellow-poplar, American sycamore, and American elm. The main soil management concern is plant competition. Plant competition from the growth of undesirable species can be a problem due to the very favorable site conditions. A new forest crop can be established by clearing and disking, using herbicides, or by managing the existing stand. Excessive rutting or miring can occur on this soil when the soil is wet. Use of equipment on this soil should be delayed until the soil is dry and gravel or other suitable material can be added to the main logging roads to reduce rutting and miring. In places, roads can be located on nearby soils that are less prone to rutting and miring. The windthrow hazard is moderate due to the water table. The stand can be thinned less intensively and more frequently than the stands in areas where the windthrow is slight.

Openland wildlife habitat potential is good, but can

be maintained and improved by providing food, cover, and places to nest or den. Field borders create natural wildlife areas. Trees and brush along the stream provide benefits to wildlife as well as erosion control. Brush piles or other nesting structures can be built.

This soil generally is unsuited to building site development due to rare flooding. Following guidelines and restrictions for building in a flood-prone area may reduce this hazard.

This soil is in capability subclass IIw.

Pl—Philo fine sandy loam, occasionally flooded

This very deep, moderately well drained, nearly level soil is on flood plains along small streams. Most areas are nearly oval in shape and range from about 6 to 125 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 7 inches thick. The subsoil, to a depth of 44 inches, is yellowish brown fine sandy loam in the upper part, in the middle part yellowish brown, mottled, fine sandy loam and light brownish gray mottled sandy loam in the lower part. The substratum, to a depth of 80 inches, is yellowish brown and light brownish gray mottled sandy loam. In some similar soils, the substratum is moderately acid or slightly acid, or the subsoil is not mottled to a depth of about 30 inches, or both.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The available water capacity is moderate or high. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. A water table is often present during the winter and spring at a depth of 1.5 to 3 feet. Flooding on most areas is occasional with the flooding interval ranging from about 5 to 50 times in 100 years. These floods are of brief duration. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Bonnie, Craigsville, Pope, Stendal, and Yeager soils on similar landscapes. Bonnie soil is poorly drained and commonly occurs as small seeps or ponded areas. Commonly, the Craigsville soil is on steam terraces and flood plains. Stendal soils are somewhat poorly drained. Yeager soils are well drained and sandy. These soils make up about 15 percent of the map unit.

Most areas of this soil are used for growing pasture and hay. Some areas are used for growing corn (fig. 9) and garden crops. A few areas that were once cleared and used for farming have reverted to woodland.

This soil is well suited to crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are susceptibility to compaction and maintaining tilth and fertility. In places, this soil is too wet to plow for longer periods of time than other soils in the area, due to a seasonally high water table. Surface drainage or tile drainage can be used to help remove excess water. Some areas are subject to scour and deposition caused by runoff from adjacent hill slopes. This runoff can be carried around the field with diversion terraces or across the field in waterways. This soil has good tilth and can be worked throughout a wide range of moisture conditions. Conservation tillage and the use of cover crops, lime, and fertilizer help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to grasses and legumes. Maintaining fertility and the hazard of flooding are the main soil management concerns. Other management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction and loss of stand. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture and soil in good condition (fig. 10).

This soil is well suited to growing trees. Productivity is high. An average stand of yellow-poplar growing on this soil would reach a height of about 102 feet in 50 years under fully stocked, unmanaged conditions. Some of the more common species are green ash, red maple, yellow-poplar, American sycamore, and American elm. The main soil management concern is plant competition. Plant competition from the growth of undesirable species can be a problem due to the very favorable site conditions. A new forest crop can be established by clearing and disking, using herbicides, or by managing the existing stand. Excessive rutting or miring can occur on this soil when the soil is wet. Use of equipment on this soil can be delayed until the soil is dry and gravel or other suitable material can be added to the main logging roads to reduce rutting and miring. In places, roads can be located on nearby soils that are less prone to rutting and miring. The windthrow hazard is moderate due to the water table. The stand can be thinned less intensively and more frequently than the stands in areas where the windthrow is slight.

Openland wildlife habitat potential is good, but can

be maintained and improved by providing food, cover, and places to nest or den. Field borders create natural wildlife areas. Trees and brush along the stream provide benefits to wildlife as well as erosion control. Brush piles or other nesting structures can be built.

This soil generally is unsuited to building site development due to occasional flooding. Following guidelines and restrictions for building in a flood-prone area may reduce this hazard.

This soil is in capability subclass IIw.

Po—Pope loam, rarely flooded

This very deep, well drained, nearly level soil is on low stream terraces along small streams. Slopes range from 0 to 2 percent. Most areas are nearly oval in shape and range from about 6 to 25 acres.

Typically, the Pope soil has a brown loam surface layer about 11 inches thick. The subsoil, to a depth of 48 inches, is brown loam in the upper part and dark yellowish brown loam in the lower part. The substratum, to a depth of 67 inches, is dark yellowish brown fine sandy loam. Some similar soils have a substratum which is moderately acid or slightly acid.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate or moderately rapid. The available water capacity is high. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. Flooding on most areas is rare, with the

Figure 9.—Corn stubble in an area of Philo fine sandy loam, occasionally flooded. This soil is well suited to cultivated crops.

Figure 10.—Cattle grazing in a pastured area of Philo fine sandy loam, occasionally flooded. This soil is well suited to pasture and hayland.

flooding interval ranging from about 1 to 5 times in 100 years. These floods are of brief duration. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Bonnie, Philo, Craigsville, Stokly, Stendal, and Yeager soils on similar landscapes and small areas of Allegheny, Barbourville, Cotaco, or Shelocta soils on stream terraces and footslopes. Bonnie soils are poorly drained and commonly occur as small seeps or ponded areas. Stokly and Stendal soils are somewhat poorly drained. Yeager soils are classified as sandy. Commonly, the Craigsville soil is on low stream terraces and flood plains. These soils make up about 10 percent of the map unit.

Most areas of this soil are used for growing cultivated crops, pasture, and hay. A few areas that were once cleared and used for farming have reverted to woodland.

This soil is well suited to crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are susceptibility to compaction and maintaining tilth and fertility. Some areas are subject to scour and deposition caused by runoff from adjacent hill slopes. This runoff can be carried around the field with diversion terraces or across the field in waterways. This soil has good tilth and can be worked throughout a wide range of moisture conditions. Conservation tillage and the use

of cover crops, lime, and fertilizer help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to grasses and legumes. Maintaining fertility and the hazard of flooding are the main soil management concerns. Other management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction and loss of stand. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture and soil in good condition.

This soil is well suited to growing trees. Productivity is high. An average stand of yellow-poplar growing on this soil would reach a height of about 96 feet in 50 years under fully stocked, unmanaged conditions. Some of the more common species are green ash, red maple, American sycamore, and river birch. The main soil management concern is plant competition. Plant competition from the growth of undesirable species can be a problem due to the very favorable site conditions. A new forest crop can be established by clearing and disking, using herbicides, or by managing the existing stand.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, and places to nest or den. Field borders create natural wildlife areas. Trees and brush along the stream provide benefits to wildlife as well as erosion control. Brush piles or other nesting structures can be built.

This soil generally is unsuited to building site development due to rare flooding. Following guidelines and restrictions for building in a flood-prone area may reduce this hazard.

This soil is in capability class I.

Pp—Pope loam, occasionally flooded

This very deep, well drained, nearly level soil is on flood plains along small streams. Slopes range from 0 to 2 percent. Most areas are nearly oval in shape and range from about 6 to 250 acres.

Typically, the Pope soil has a brown loam surface layer about 11 inches thick. The subsoil, to a depth of 48 inches, is brown loam in the upper part and dark yellowish brown loam in the lower part. The substratum, to a depth of 67 inches, is dark yellowish brown fine sandy loam. Some similar soils have a substratum which is moderately acid or slightly acid.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate or moderately rapid. The available water capacity is high. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. Flooding on most areas is occasional with the flooding interval ranging from about 5 to 50 times in 100 years. These floods are of brief duration. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Bonnie, Philo, Craigsville, Stokly, Stendal, and Yeager soils on similar landscapes and small areas of Allegheny, Barbourville, Cotaco, or Shelocta soils on stream terraces and footslopes. Bonnie soils are poorly drained and commonly occur as small seeps or ponded areas. Stokly and Stendal soils are somewhat poorly drained. Yeager soils are classified as sandy. Commonly, the Craigsville soil is on low steam terraces and flood plains. These soils make up about 10 percent of the map unit.

Most areas of this soil are used for cultivated crops, pasture, and hay. A few areas that were once cleared and used for farming have reverted to woodland.

This soil is well suited to crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are susceptibility to compaction and maintaining tilth and fertility. Some areas are subject to scour and deposition caused by runoff from adjacent hill slopes. This runoff can be carried around the field with diversion terraces or across the field in waterways. This soil has good tilth and can be worked throughout a wide range of moisture conditions. Conservation tillage and the use of cover crops, lime, and fertilizer help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to grasses and legumes. Maintaining fertility and the hazard of flooding are the main soil management concerns. Other management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction and loss of stand. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture and soil in good condition.

This soil is well suited to growing trees. Productivity is high. An average stand of yellow-poplar growing on this soil would reach a height of about 96 feet in 50 years under fully stocked, unmanaged conditions. Some of the more common species are green ash, red maple, American sycamore, and river birch. The main soil management concern is plant competition. Plant competition from the growth of undesirable species can be a problem

due to the very favorable site conditions. A new forest crop can be established by clearing and disking, using herbicides, or by managing the existing stand.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, and places to nest or den. Field borders create natural wildlife areas. Trees and brush along streams provide benefits to wildlife and help erosion control. Brush piles or other nesting structures can be built.

This soil generally is unsuited to building site development due to occasional flooding. Following guidelines and restrictions for building in a flood-prone area may reduce this hazard.

This soil is in capability subclass IIw.

Pr—Pope fine sandy loam, occasionally flooded

This very deep, well drained, nearly level soil is on flood plains along small streams (fig. 11). Slopes range from 0 to 2 percent. Most areas are nearly oval in shape and range from about 6 to 250 acres.

Typically, the Pope soil has a brown fine sandy loam surface layer about 11 inches thick. The subsoil, to a depth of 48 inches, is brown loam in the upper part and dark yellowish brown loam in the lower part. The substratum, to a depth of 67 inches, is dark yellowish brown fine sandy loam. Some similar soils have a substratum which is moderately acid or slightly acid.

This soil is medium in natural fertility and moderate

Figure 11.—An area of Pope fine sandy loam, occasionally flooded, on a flood plain in the foreground. The Pope soil is well suited to hay. Shelocta-Cloverlick-Kimper complex, 35 to 75 percent slopes, very stony, is on the wooded hillside in the background. It is well suited to woodland.

in organic matter content. Permeability is moderate or moderately rapid. The available water capacity is high. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. Flooding on most areas is occasional with the flooding interval ranging from about 5 to 50 times in 100 years. These floods are of brief duration. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Bonnie, Philo, Craigsville, Stokly, Stendal, and Yeager soils on similar landscapes and small areas of Allegheny, Barbourville, Cotaco, or Shelocta soils on stream terraces and footslopes. Bonnie soils are poorly drained and commonly occur as small seeps or ponded areas. Stokly and Stendal soils are somewhat poorly drained. Yeager soils are classified as sandy. Commonly, the Craigsville soil is on low stream terraces and flood plains. These soils make up about 10 percent of the map unit.

Most areas of this soil are used for growing cultivated crops, pasture, and hay. A few areas that were once cleared and used for farming have reverted to woodland.

This soil is well suited to crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are susceptibility to compaction and maintaining tilth and fertility. Some areas are subject to scour and deposition caused by runoff from adjacent hill slopes. This runoff can be carried around the field with diversion terraces or across the field in waterways. This soil has good tilth and can be worked throughout a wide range of moisture conditions. Conservation tillage and the use of cover crops, lime, and fertilizer help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to grasses and legumes. Maintaining fertility and the hazard of flooding are the main soil management concerns. Other management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction and loss of stand. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture and soil in good condition.

This soil is well suited to growing trees. Productivity is high. An average stand of yellow-poplar growing on this soil would reach a height of about 96 feet in 50 years under fully stocked, unmanaged conditions. Some of the more common species are green ash, red maple, American sycamore, and river birch. The main soil management concern is plant competition. Plant competition from the growth of undesirable species can be a problem due to the very favorable site conditions. A new forest crop can be established by clearing and disking, using herbicides, or by managing the existing stand.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, and places to nest or den. Field borders create natural wildlife areas. Trees and brush along streams provide benefits to wildlife as well as erosion control. Brush piles or other nesting structures can be built.

This soil generally is unsuited to building site development due to occasional flooding. Following guidelines and restrictions for building in a flood-prone area may reduce this hazard.

This soil is in capability subclass IIw.

ShB—Shelocta gravelly silt loam, 2 to 6 percent slopes

This deep, well drained, gently sloping soil is on footslopes. These areas commonly lie at the base of drainageways that dissect the hillsides. On most areas the elevations range from about 800 to 1,000 feet. The shape of the slope downhill commonly is slightly concave and across the contour it is convex, except where broken by a stream channel. The natural drainageway commonly splits into two or more channels along the upper slopes of this unit. Most areas of this soil are nearly oval or pear-shaped and range from about 6 to 20 acres.

Typically, the Shelocta soil has a surface layer that is brown gravelly silt loam about 3 inches thick and a subsurface of dark yellowish brown silt loam about 7 inches thick. The subsoil, to a depth of 20 inches, is yellowish brown silty clay loam and from 20 to 45 inches is yellowish brown channery silty clay loam. Weathered gray shale occurs from 45 to 55 inches.

This soil is low in natural fertility and moderate in organic matter content. The available water capacity is high. Permeability is moderate. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. The depth to bedrock is 40 to 60 inches.

Contrasting inclusions in this map unit are small areas of Cotaco soils on steam terraces and alluvial fans. Cotaco soils are moderately well drained. Other contrasting inclusions are the Philo, Pope, Craigsville, and Yeager soils on low stream terraces and flood plains. Philo and Pope are coarse-loamy. Yeager is sandy. Craigsville is loamy-skeletal. Also included are small areas of Highsplint soils that have stones and

boulders on the surface and are commonly on the upper part of the footslopes. In places, short, very steep slopes are adjacent to the stream meanders. These inclusions amount to about 15 percent of the map unit.

Most areas of this soil are in pasture. Many areas, once cleared and used for farming, have reverted to woodland. A few areas are used for cultivated crops and gardens.

This soil is well suited to growing cultivated crops such as corn and tobacco, as well as the commonly grown garden crops (fig. 12). Soil management concerns are keeping erosion to a minimum and maintaining tilth and fertility. On some areas runoff from adjacent hill slopes can cause gully erosion or can deposit gravel. This runoff can be carried around the field with diversion terraces or across the field in waterways. Terraces, conservation tillage, and crop rotation can be used to reduce erosion. There are no soil limitations for the construction and use of terraces. Crop rotations with about 1 out of 4 years in grass or legume meadow are needed to control erosion on most areas. Conservation tillage can be used to grow continuous crops on many areas without excessive erosion. Conservation tillage and the use of cover crops help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is suited to grasses and legumes. Species such as tall fescue and lespedeza are tolerant of acid, infertile subsoil conditions and are best suited. However, with adequate lime and fertilizer good yields can be obtained from most forage species. Pasture management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction, loss of stand, and excessive runoff. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture in good condition.

This soil is suited to growing trees. Productivity is moderate. An average stand of white oak growing on this soil typically would reach a height of about 77 feet in 50 years under fully stocked, unmanaged conditions. Plant competition is the major soil management concern. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

This soil is suited to building site development. There are no soil limitations for dwellings without basements and commercial buildings. Depth to bedrock and soil permeability is a moderate limitation for conventional septic tank absorption fields and dwellings with basements.

This soil is in capability subclass IIe.

ShC—Shelocta gravelly silt loam, 6 to 12 percent slopes

This deep, well drained, sloping soil is on side slopes and footslopes. These areas commonly lie at the base of drainageways that dissect the hillsides.

Figure 12.—A harvested cornfield in an area of Shelocta gravelly silt loam, 2 to 6 percent slopes. Gilpin-Shelocta complex, 12 to 20 percent slopes, eroded, is on the toeslope in the background. It is suited to pasture and woodland.

On most areas the elevations range from about 800 to 1,000 feet. The shape of the slope downhill commonly is slightly concave and across the contour it is convex except where broken by a stream channel. The natural drainageway commonly splits into two or more channels along the upper slopes of the unit. Most areas of this soil are nearly oval or pear-shaped and range from about 4 to 20 acres.

Typically, the Shelocta soil has a surface layer that is brown gravelly silt loam about 3 inches thick and a subsurface of dark yellowish brown silt loam about 7 inches thick. The subsoil, to a depth of 20 inches, is yellowish brown silty clay loam and from 20 to 45 inches is yellowish brown channery silty clay loam. Weathered gray shale occurs from 45 to 55 inches.

This soil is low in natural fertility and moderate in organic matter content. The available water capacity is high. Permeability is moderate. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. The depth to bedrock is 40 to 60 inches.

Contrasting inclusions in this map unit are small areas of Cotaco soils on steam terraces and alluvial fans. Cotaco soils are moderately well drained. Other contrasting inclusions are the Philo, Pope, Craigsville, and Yeager soils on low stream terraces and flood plains. Philo and Pope are coarse-loamy. Yeager is sandy. Craigsville is loamy-skeletal. Also included are small areas of Highsplint soils that have stones and boulders on the surface and are commonly on the upper part of the fans. In places, short, very steep slopes are adjacent to the stream meanders. These inclusions amount to about 15 percent of the map unit.

Most areas of this soil are in pasture. Many areas, once cleared and used for farming, have reverted to woodland. A few areas are used for cultivated crops and gardens.

This soil is suited to growing cultivated crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are keeping erosion to a minimum and maintaining tilth and fertility. On some areas runoff from adjacent hill slopes can cause gully erosion or can deposit gravel. This runoff can be carried around the field with diversion terraces or across the field in waterways. Terraces, conservation tillage, and crop rotation can be used to reduce erosion. Other than slope, there are no soil limitations for the construction and use of terraces. As the slope increases, deeper cuts and fills are needed to construct the terraces. Crop rotations with about 2 out of 4 years in grass or legume meadow are needed to control erosion on most areas. Conservation tillage can be used to increase the number of years of cultivated crops in rotation. Conservation tillage and the use of cover crops help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is suited to grasses and legumes. Species such as tall fescue and lespedeza are tolerant of acid, infertile subsoil conditions and are best suited. However, with adequate lime and fertilizer good yields can be obtained from most forage species. Pasture management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction, loss of stand, and excessive runoff. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture in good condition.

This soil is suited to growing trees. Productivity is moderate. An average stand of white oak growing on this soil would reach a height of about 77 feet in 50 years under fully stocked, unmanaged conditions. Plant competition is the major soil management concern. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and the use of herbicides or cutting.

Openland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

This soil is suited to building site development. Slope is a moderate soil limitation for dwellings with and without basements and commercial buildings. Leveling is needed to modify the slope. Depth to bedrock, soil permeability, and slope are moderate limitations for conventional septic tank absorption fields. Depth to bedrock is also a moderate limitation for dwellings with basements.

This soil is in capability subclass IIIe.

SkF—Shelocta-Cloverlick-Kimper complex, 35 to 75 percent slopes, very stony

These deep and very deep, well drained, very steep soils are on the cool side slopes of hills. The elevations range from about 1,800 feet near the hill crest to about 800 feet along the base of the hill. The downward slope of the hill is nearly linear, except where broken by small cliffs or benches, with only a slight flattening of the slopes near the top and bottom of the hill. Across the hill the slope is distinctly corrugated. Small streams within the grooves commonly begin near the hill crest and run to about the base of the hill before joining other streams. In most places, these small streams are spaced about 300 to 600 feet apart. Lying between these streams are sharp-crested ribs with fairly smooth slopes. Stones and boulders on most areas cover about 0.1 to 15 percent of the surface. Most areas of the Cloverlick soil that are in the ravines and below some cliffs have about 15 to 70 percent of the surface covered by stones and boulders. Most areas of this complex are nearly rectangular or irregular in shape and range from about 10 to 275 acres.

On a typical area the composition is: Shelocta and similar soils 24 percent; Cloverlick and similar soils 24 percent; Kimper and similar soils 22 percent; contrasting inclusions 28 percent; and rock outcrop 2 percent. Shelocta and Kimper soils are in coves and on upper side slopes. Cloverlick soil is in the ravines, on lower side slopes and on other colluvial areas. These soils are so intermingled that they can not be separated at the scale selected for mapping.

Typically, the Shelocta soil has a surface layer that is brown gravelly silt loam about 3 inches thick and a subsurface of dark yellowish brown silt loam about 7 inches thick. The subsoil, to a depth of 20 inches, is yellowish brown silty clay loam and from 20 to 45 inches is yellowish brown channery silty clay loam. Weathered gray shale occurs from 45 to 55 inches.

Typically, the Cloverlick soil has a very dark grayish brown and dark brown channery loam surface 6 inches thick. The subsoil, to a depth of 63 inches, is brown and yellowish brown very and extremely channery loam. The substratum from 63 to 85 inches is yellowish brown extremely channery loam. The subsoil extends to a depth of 85 inches and is yellowish brown extremely channery loam.

Typically, the Kimper soil has a dark brown and brown loam and channery loam surface layer about 19 inches thick. The subsoil, to a depth of 60 inches, is yellowish brown channery loam in the upper part and yellowish brown channery clay loam in the lower part. The substratum from 60 to 80 inches is yellowish brown channery clay loam.

These soils are low in natural fertility. The organic matter content is moderate in the Shelocta soil and high in the Kimper and Cloverlick soils. The available water capacity is high, except for the Cloverlick soil which is moderate. Permeability is moderate for the Shelocta and Kimper soils and moderately rapid for Cloverlick soils. The number of roots generally decreases gradually with depth and there are generally few roots below about 18 inches. The depth to bedrock is 40 inches or more.

Contrasting inclusions in this map unit are Gilpin and Highsplint soils and small areas of moderately deep loamy soils. The moderately deep soils are predominantly on the convex ribs, but can be throughout this complex. Some of the moderately deep, loamy soils contain large amounts of rock fragments and are scattered throughout this complex on areas where sandstone is the dominant parent material. Soils with thick, dark surface horizons occur on concave slopes such as in coves and the innermost part of the small benches. These soils make up about 28 percent of this complex. Rock outcrops make up about 2 percent of this complex and commonly occur as ledges or cliffs.

Most areas of this soil are in woodland. A few areas adjacent to the stream valleys are cleared and used for unimproved pasture.

These soils are well suited to growing trees (fig. 13). Productivity is high. An average stand of yellow-poplar growing on the Shelocta soil typically would reach a height of about 102 feet in 50 years under fully stocked, unmanaged conditions. On the Kimper soil, a similar stand would reach a height of 112 feet. Some of the more common tree species in coves and on the lower slopes are yellow-poplar, sugar maple, American beech, and eastern hemlock. On other areas these species are mixed with northern red oak, red maple, white oak, chestnut oak, cucumber tree, basswood, yellow buckeye, and various hickories, as well as numerous minor species. Many old fields have reverted to nearly pure stands of yellow-poplar, or the fields were planted to eastern white pine or other pine species. Common understory plants include flowering dogwood, American hornbeam, vacciniums, hydrangea, and greenbriers. The herbaceous flora is luxuriant and contains numerous species.

The hazard of erosion, equipment limitations, and plant competition are the major soil management

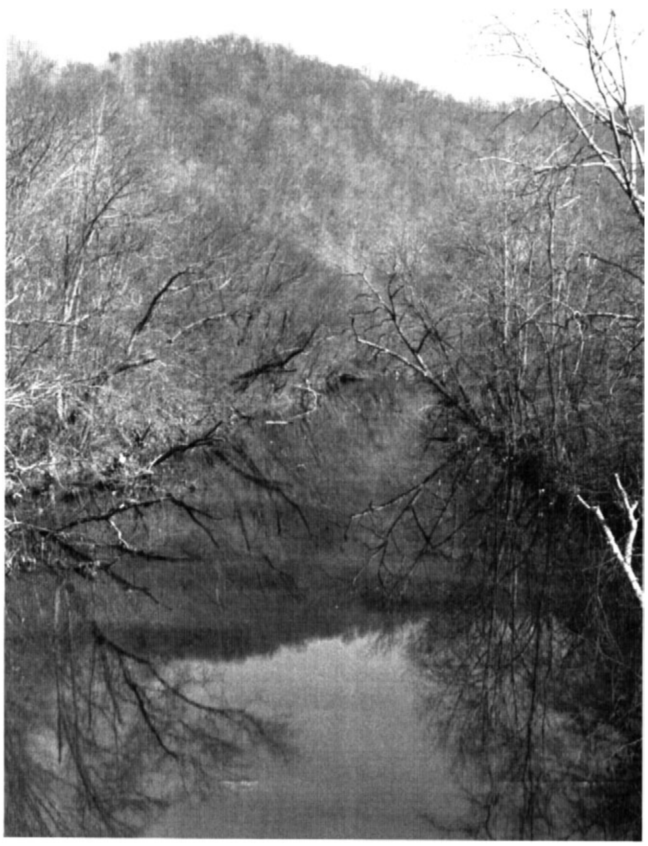

Figure 13.—An area of Shelocta-Cloverlick-Kimper complex, 35 to 75 percent slopes, very stony, on the hillside in the background. These soils can produce high timber yields. The Redbird River is in the foreground.

concerns. Soil erosion usually is associated with haul roads and skid trails. To help reduce erosion, a grade of less than 10 percent can be used for roads and trails and the area of soil disturbance can be kept to 10 percent or less. Permanent access roads can be protected by using water bars, culverts, and gravel. Because of the very steep slopes, crawler tractors or other specialized equipment generally is needed. Logs can be yarded to roads and trails located on the contour. Planting can be done by hand or direct seeding. Plant competition from the growth of undesirable species can be a problem due to the very favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Woodland wildlife habitat potential is good, but can be maintained and improved by providing food, cover, and places to nest or den. Brushy thickets can be established by clearing small areas in large tracts of mature woodland. Food plots or green browse areas can be planted along logging roads and trails. Areas that produce native plants can be improved by disking and fertilizing. Den trees can be left and brush piles or other nesting structures can be built.

These soils generally are unsuitable for cultivated crops, pasture, and building site development due to the very steep slopes. These soils are rated severe for slippage; meaning they are susceptible to downslope movement when loaded, excavated or wet.

These soils are in capability subclass VIIe.

SIF—Shelocta-Highsplint complex, 35 to 75 percent slopes, very stony

These deep and very deep, well drained, very steep soils are on the warm side slopes of hills (fig. 14). The elevations range from about 1,800 feet near the hill crest to about 800 feet along the base of the hill. The downward slope of the hill is nearly linear, except where broken by small cliffs or benches, with only a slight flattening of the slopes near the top and bottom of the hill. Across the hill the slope is distinctly corrugated. Small streams within the grooves commonly begin near the hill crest and run to about the base of the hill before joining other streams. In most places, these small streams are spaced about 300 to 600 feet apart. Lying between these streams are sharp-crested ribs with fairly smooth slopes. Stones and boulders on most areas cover about 0.1 to 15 percent of the surface. Most areas of the Highsplint soil that are in the ravines and below some cliffs have about 15 to 70 percent of the surface covered by stones and boulders. Most areas of this complex are nearly rectangular and range from about 10 to 150 acres.

On a typical area the composition is: Shelocta and similar soils 60 percent; Highsplint and similar soils 20 percent; and contrasting inclusions 20 percent. Shelocta soil is throughout this complex. Highsplint soil is in the ravines, on lower side slopes, and on many other colluvial areas. The areas of these soils are so intricately mixed, or so small in size, that it is not practical to separate them in mapping.

Typically, the Shelocta soil has a surface layer that is brown gravelly silt loam about 3 inches thick and a subsurface of dark yellowish brown silt loam about 7 inches thick. The subsoil, to a depth of 20 inches, is yellowish brown silty clay loam and from 20 to 45 inches is yellowish brown channery silty clay loam. Weathered gray shale occurs from 45 to 55 inches.

Typically, the Highsplint soil has a surface layer about 2 inches thick and is yellowish brown channery loam. The subsoil, to a depth of 51 inches, is yellowish brown channery and very flaggy loam in the upper part and is yellowish brown mottled very flaggy

loam in the lower part. The substratum, to a depth of 80 inches, is yellowish brown mottled extremely flaggy sandy clay loam.

These soils are low in natural fertility and moderate in organic matter content. The available water capacity is high in the Shelocta soil and moderate in the Highsplint soil. Permeability is moderate in the Shelocta soil and moderate to moderately rapid in the Highsplint soil. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. The depth to bedrock is 40 inches or more.

Contrasting inclusions in this map unit are small areas of Kimper, Sequoia, and Gilpin soils along with shallow, loamy or moderately deep, loamy soils. The Kimper soil and a deep, loamy soil with a thick, dark surface layer are on small areas of cool side slopes. Sequoia and Gilpin soils are scattered throughout this complex. Small areas located on footslopes have slopes less than 35 percent. The shallow, loamy or moderately deep, loamy soils are on some of the convex ribs. These soils make up about 18 percent of this complex. Rock outcrops make up about 2 percent of this complex and commonly occur as ledges or cliffs.

Most areas of this soil are in woodland. A few areas adjacent to the stream valleys are cleared and used for unimproved pasture.

These soils are suited to growing trees. Productivity is moderate (fig. 15). An average stand of white oak growing on the Shelocta soil would reach a height of about 65 feet in 50 years under fully

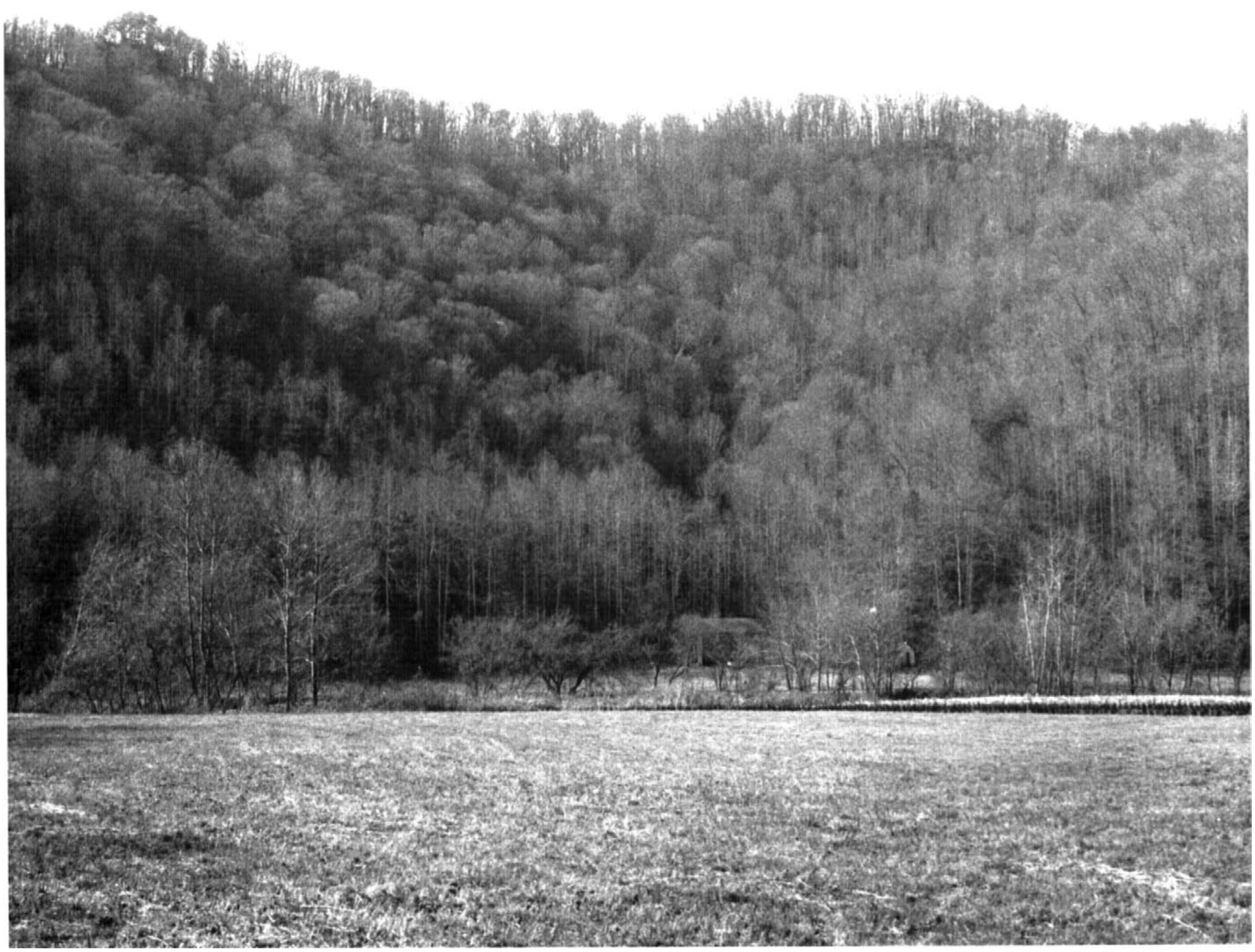

Figure 14.—An example of warm and cool aspects in a forested cove. On the right, with the warm aspect, is an area of Shelocta-Highsplint complex, 35 to 75 percent slopes, very stony. On the left, with the cool aspect, is an area of Shelocta-Cloverlick-Kimper complex, 35 to 75 percent slopes, very stony. An area of Pope fine sandy loam, occasionally flooded, is on the flood plain in the foreground.

stocked, unmanaged conditions. Some of the more common tree species in coves and on the lower slopes are white oak, American beech, and yellow-poplar. On other areas these species are mixed with chestnut oak, scarlet oak, red maple, black gum, northern red oak, sugar maple, pitch pine, and various hickories, as well as numerous minor species. Many old fields have reverted to nearly pure stands of yellow-poplar or the fields were planted to eastern white pine or other pine species. Common understory plants include flowering dogwood, American hornbeam, sassafras, eastern redbud, grape, mountain-laurel, and greenbriers. The herbaceous flora is sparse, but numerous species are found.

The hazard of erosion, equipment limitations, seedling mortality, and plant competition are the major soil management concerns. Soil erosion usually is associated with haul roads and skid trails. To help reduce erosion, a grade of less than 10 percent can be used for roads and trails and the area of soil disturbance can be kept to 10 percent or less. Permanent access roads can be protected by using water bars, culverts, and gravel. Because of the very steep slopes, crawler tractors or other specialized equipment generally is needed. Logs can be yarded to roads and trails located on the contour. Planting can be done by hand or direct seeding. Seedling mortality can be greater than usual because of south and west exposures. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and the use of herbicides or cutting.

Figure 15.—A forested side slope in an area of Shelocta-Highsplint complex, 35 to 75 percent slopes, very stony. Woodland productivity is moderate in areas of this map unit.

Woodland wildlife habitat potential is good, but can be maintained and improved by providing food, cover and places to nest or den. Brushy thickets can be established by clearing small areas in large tracts of mature woodland. Food plots or green browse areas can be planted along logging roads and trails. Areas that produce native plants can be improved by disking and fertilizing. Den trees can be left and brush piles or other nesting structures can be built.

These soils generally are unsuitable for cultivated crops, pasture, and building site development due to the very steep slopes. These soils are rated severe for slippage; meaning they are susceptible to downslope movement when loaded, excavated, or wet.

These soils are in capability subclass VIIe.

Sn—Stendal silt loam, occasionally flooded

This very deep, somewhat poorly drained, nearly level soil is on flood plains along the major streams. Slopes range from 0 to 2 percent. Most areas are oval and range from about 5 to 10 acres.

Typically, the Stendal soil has a dark brown and dark grayish brown silt loam surface layer about 10 inches thick. The subsoil, to a depth of 25 inches, is grayish brown mottled silt loam. The substratum, to a depth of 60 inches, is gray, mottled, silt loam in the upper part and gray, mottled, silty clay loam in the lower part. Hard sandstone bedrock occurs at 62 inches.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The available water capacity is high. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. A water table is often present during the winter and spring at a depth of .5 foot to 1.5 feet. Flooding on most areas is occasional (fig. 16) with the flooding interval

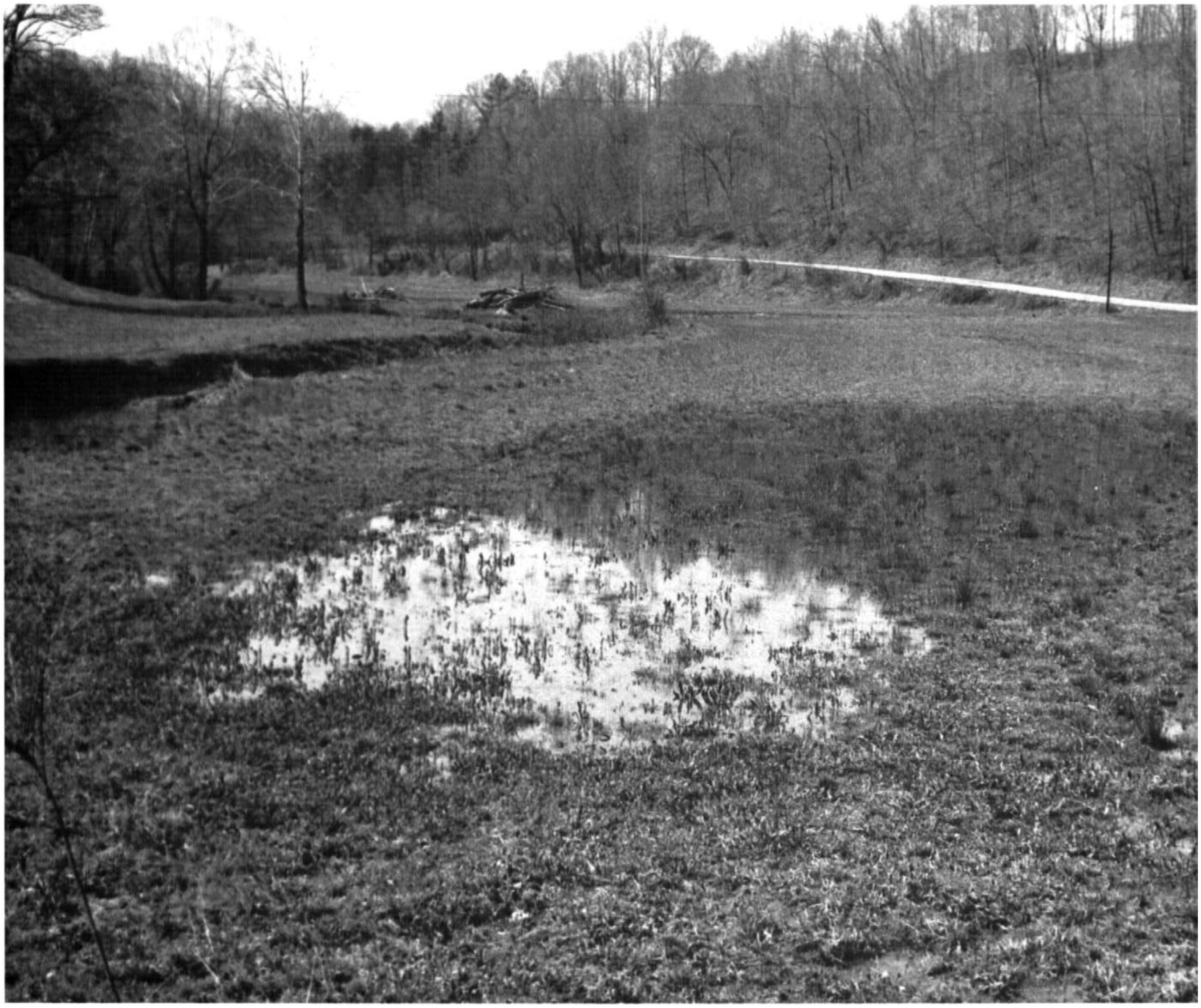

Figure 16.—Ponding in an area of Stendal silt loam, occasionally flooded, on a flood plain. Low areas in some map units are subject to flooding in winter and early in spring followed by brief periods of ponding.

ranging from about 5 to 50 times in 100 years. These floods are of brief duration. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Bonnie and Pope soils on similar landscapes. Bonnie is poorly drained and Pope is coarse-loamy and well drained. These soils make up about 10 percent of the map unit.

Most areas of this soil are used for growing cultivated crops and hay. Some areas are used for pasture. A few areas that were once cleared and used for farming have reverted to woodland.

This soil is suited to cultivated crops such as corn as well as the commonly grown garden crops. Soil management concerns are excessive wetness and maintaining tilth and fertility. This soil is wet for several days longer than the better drained soils. Surface drainage or tile drainage can be used to help remove excess water. On some areas, runoff from adjacent hill slopes can cause gully erosion or can deposit gravel. This runoff can be carried around the field with diversion terraces or across the field in waterways. This soil has good tilth and can be worked throughout a wide range of moisture conditions. The soil below the normal tillage zone is susceptible to compaction. Conservation tillage and the use of cover crops, lime, and fertilizer help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to pasture and hay. Soil management concerns are excessive wetness and low fertility. This soil is wet for several weeks during the winter and spring. Plants that are tolerant of wet conditions are best suited. Species such as tall fescue and timothy are tolerant of wet, infertile subsoil conditions and are best suited. However, with adequate drainage and the addition of lime and fertilizer, good yields can be obtained from most forage species. Other management concerns are preventing overgrazing and maintaining a good stand. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture and soil in good condition.

This soil is suited to growing trees. Productivity is moderate. Plant competition and equipment limitations are the major soil management concerns. Excessive rutting or miring can occur on this soil when it is wet. Use of equipment can be delayed until the soil is dry and gravel or other suitable material can be added to the main logging roads to reduce rutting and miring. Where available, roads can be located on nearby soils that are less prone to rutting and miring. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Openland wildlife habitat potential is fair and can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

This soil is unsuited to building site development due to occasional flooding. Following guidelines and restrictions for building in a flood-prone area may reduce this hazard. In addition, wetness is a limitation.

This soil is in capability subclass IIw.

St—Stokly fine sandy loam, occasionally flooded

This very deep, somewhat poorly drained, nearly level soil is on flood plains along small streams. Slopes range from 0 to 2 percent. Most areas are oval and range from about 5 to 10 acres.

Typically, the Stokly soil has a dark yellowish brown and light olive brown, fine sandy loam surface layer about 8 inches thick. The subsoil, to a depth of 21 inches, is strong brown and yellowish brown, mottled, loam and sandy loam. The subsoil, to a depth of 40 inches, is strong brown and light olive gray mottled gravelly sandy loam and gray and brownish yellow sandy loam. The substratum, to a depth of 76 inches, is olive gray gravelly sandy loam.

This soil is moderate in natural fertility and moderate in organic matter content. Permeability is moderately rapid. The available water capacity is moderate. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. A water table is often present during the winter and spring at a depth of 0.5 foot to 1.5 feet. Flooding on most areas is occasional with the flooding interval ranging from about 5 to 50 times in 100 years. These floods are of brief duration. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Bonnie, Craigsville and Pope soils on similar landscapes. Bonnie soils are poorly drained and are fine-silty. Pope soils are well drained. Craigsville soils are loamy-skeletal. These soils make up about 10 percent of the map unit.

Most areas of this soil are used for growing cultivated crops and hay. Some areas are used for pasture. A few areas that were once cleared and used for farming have reverted to woodland.

This soil is suited to cultivated crops such as corn or tobacco, as well as the commonly grown garden crops. Soil management concerns are excessive wetness and maintaining tilth and fertility. This soil has a high water table for several days longer than the better drained soils. Surface drainage or tile drainage can be used to help remove excess water. On some areas, runoff from adjacent hill slopes can cause gully erosion or can deposit gravel. This runoff can be carried around the field with diversion terraces or across the field in waterways. This soil has good tilth and can be worked throughout a wide range of moisture conditions. The soil below the normal tillage zone is susceptible to compaction. Conservation tillage and the use of cover crops, lime, and fertilizer help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to pasture and hay (fig. 17). Soil management concerns are excessive wetness and low fertility. This soil has a high water table for several weeks during the winter and spring. Plants that are tolerant of wet conditions are best suited. Species such as tall fescue and timothy are tolerant of wet, infertile subsoil conditions and are best suited.

However, with adequate drainage and the addition of lime and fertilizer, good yields can be obtained from most forage species. Other management concerns are preventing overgrazing and maintaining a good stand. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture and soil in good condition.

This soil is suited to growing trees. Productivity is moderate. Excessive rutting or miring can occur on this soil when it is wet. Use of equipment can be delayed until the soil is dry and gravel or other suitable material can be added to the main logging roads to reduce rutting and miring. Where available, roads can be located on nearby soils that are less prone to rutting and miring. Plant competition from the growth of undesirable species can be a problem due to the favorable site conditions. A new forest crop can be established by managing the existing stand and with the use of herbicides or cutting.

Figure 17.—An area of Stokly fine sandy loam, occasionally flooded, which is well suited to hay. Where drained, this soil meets the criteria for prime farmland. The forested side slope in the background is in an area of Gilpin-Shelocta loam, 20 to 35 percent slopes, eroded.

Openland wildlife habitat potential is fair and can be maintained and improved by providing food, cover, water, and places to nest or den. Field borders create natural wildlife areas. Trees and shrubs in small areas and along fence rows can break up large open areas and provide food and cover. Areas that produce native plants can be improved by disking and fertilizing. Brush piles or other nesting structures can be built.

This soil generally is unsuited to building site development due to occasional flooding. Following guidelines and restrictions for building in a flood-prone area may reduce this hazard. In addition, wetness is a moderate or severe limitation.

This soil is in capability subclass IIw.

Ud—Udorthents-Urban land complex, rarely flooded

Udorthents are very deep, nearly level, well drained soils formed in gravelly, loamy fill material and the underlying natural soil. The fill material is surface mine spoil, coal refuse, or other earthy material. Urban land is land covered by houses, streets, parking lots, buildings, and other urban structures. These areas are on flood plains or stream terraces. Within these areas the natural drainage pattern commonly has been altered and replaced by a system of ditches and storm drains. Most of these areas are nearly rectangular and range from about 6 to 340 acres.

On a typical area the composition is: Udorthents 55 percent; Urban land 20 percent; and contrasting inclusions 25 percent. The areas of the soil and Urban land are so intermingled that they can not be separated at the scale selected for mapping.

Typically, the Udorthents have a very dark grayish brown silt loam surface layer about 5 inches. The next layer is yellowish brown gravelly silty clay loam to 35 inches. Beneath and to a depth of 60 inches is dark brown and dark yellowish brown silt loam. In many places the depth of the gravelly material is variable.

The Urban land is land covered by houses, streets, parking lots, buildings, and other urban structures.

The natural fertility and the organic matter content are low. Permeability in the upper part of the profile varies widely because of the nature of the material. Generally, the permeability in the lower part is moderately rapid. The available water capacity is moderate. The depth of the fill material generally is 20 to 40 inches. Flooding generally occurs once every 10 to 100 years and is of very brief duration. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are areas of Pope, Philo, and Craigsville soils less than about 5 acres in size. These included soils are well suited to lawns and gardens. Also included are areas of gravelly or cobbly soils on small alluvial fans. These inclusions make up about 25 percent of this complex.

Most areas of this complex are used for urban development. A few areas are not presently developed.

These areas are poorly suited to urban development because of the hazard of flooding. In some areas of the county, better suited building sites are not available. Where restrictions and guidelines for building on a flood plain are followed these areas are suited to urban development. There are no soil limitations, other than flooding, for dwellings without basements and small commercial buildings. Small community waste treatment plants can be used. Where local roads and streets are constructed, the low strength of this soil can affect the traffic supporting capacity. Gravel or other suitable material can be added to provide a suitable base. Shallow excavation into this material is potentially dangerous because trenches are susceptible to a cave-in. Low clay content is generally responsible for such incohesiveness in these materials. To help reduce the threat of cave-in, the sidewalls can be shaped or shoring can be used.

The soil conditions generally are favorable for establishing lawns and other landscaping plants as well as for growing gardens crops. In some places there are too many stones. The larger stones can be removed or a better suited topsoil material can be added. The main soil management concerns for growing garden crops are maintaining tilth and fertility. The areas of included soils, namely the Pope and Philo, are best suited. Adding organic material such as straw, leaves, or compost helps to maintain tilth. The reaction varies from strongly acid to neutral depending on the kind of fill material. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

Wildlife habitat in urban areas can be improved by providing food, cover, and places to nest or den. Many shrubs and trees furnish food. Wooded areas on steep slopes and along streams can be maintained. Field borders around parks, cemeteries, and utility rights-of-way can provide habitat diversity. Certain grass and wildflower species can provide an

alternative ground cover to manicured lawns as well as wildlife benefits. Nesting and denning structures can be built.

This complex is not assigned a capability classification.

UrC—Udorthents-Urban land complex, 3 to 15 percent slopes

Udorthents are very deep, gently sloping or sloping, well drained soils formed in channery, loamy material. On most areas the channery, loamy material consists of mixed topsoil, subsoil, and the substratum where the natural soil was graded and smoothed in order to build houses or other urban structures. Urban land is land covered by houses, streets, parking lots, buildings, and other urban structures. These areas are on uplands. In places, the natural drainage pattern has been altered and is replaced by a system of ditches and storm drains. These areas are nearly rectangular and range from about 6 to 100 acres.

On a typical area the composition is: Udorthents 55 percent; Urban land 20 percent; and contrasting inclusions 25 percent. The areas of the soil and Urban Land are so intermingled that they can not be separated at the scale selected for mapping.

Typically, the Udorthents have a strong brown channery silt loam surface layer about 10 inches thick. The substratum to a depth of 50 inches is yellowish brown channery silty clay loam. Beneath is siltstone bedrock.

The natural fertility and the organic matter content are low. Permeability varies widely because of the nature of the materials. The available water capacity is moderate or low. On most areas either the depth of the mixed material is 20 to 40 inches; or about 10 inches or more of the natural soil was removed. Depth to bedrock ranges from 40 to 72 inches or more.

Contrasting inclusions in this map unit are areas of Gilpin and Shelocta soils along with small areas of shallow, loamy soils. Narrow, steeper sloping areas or nearly vertical escarpments consisting of soil, bedrock, and rubble can occur where cutting or filling was performed. The Gilpin and Shelocta soils make up about 20 percent and the shallow, loamy soils make up about 5 percent of this complex.

Most areas of this complex are used for urban and rural development.

These areas are suited to urban and rural development. Depth to bedrock in some places and slope on most areas are soil limitations when considering shallow excavations, dwellings with or without basements, roads or streets, and lawns. On other areas where the slope is less than about 8 percent, the main soil limitation, if any, is depth to bedrock. Roads, streets, dwellings, and small commercial buildings can be designed according to the slope. In places, the land can be shaped to modify the slope. The slope can also affect the ease of using machinery during construction. Because of the slope there is a hazard of erosion during and after construction until permanent vegetation is established. The depth to bedrock can affect the ease of digging, filling, and shaping during construction. In places, heavy equipment or blasting is needed. Where septic tank absorption fields are used, the areas that do not have bedrock within a depth of 72 inches are best suited. In places, low strength is an additional limitation where local roads and streets are constructed. Gravel or other suitable material can be added to provide a suitable base and to improve traffic supporting capacity.

The soil conditions generally are favorable for establishing lawns and other landscaping plants, as well as for growing garden crops. Less favorable conditions commonly are caused from a large number of small stones, excessive compaction during grading and smoothing, limited rooting depth, removal of the surface soil, or various combinations of these factors. Species that are tolerant of acid, infertile and often droughty conditions are best suited. With adequate lime, fertilizer, and water most commonly grown lawn and landscaping plants can be used. An additional practice that helps to assure a successful seeding on less favorable areas is incorporating organic matter such as bark and mulching. In places, excessive amounts of stones, shallow soil depth, or short steep slopes can affect the ease of establishing and maintaining lawns. A better suited topsoil material can be added or a ground cover can be used.

Wildlife habitat in urban areas can be improved by providing food, cover, and places to nest or den. Many shrubs and trees furnish food. Wooded areas on steep slopes and along streams can be maintained. Field borders around parks, cemeteries, and utility rights-of-way can provide habitat diversity. Certain grass and wildflower species can provide an alternative ground cover to manicured lawns as well as wildlife benefits. Nesting and denning structures can be built.

This complex is not assigned a capability classification.

UrE—Udorthents-Urban land complex, 15 to 35 percent slopes

Udorthents are very deep, moderately steep or steep, well drained soils formed in channery, loamy material. On most areas the channery, loamy material consists of mixed topsoil, subsoil, and the substratum where the natural soil was graded and smoothed in order to build houses or other urban structures. Urban land is land covered by houses, streets, parking lots, buildings, and other urban structures. These areas are on uplands. In places, the natural drainage pattern has been altered and replaced by a system of ditches and storm drains. These areas are nearly rectangular and range from about 6 to 150 acres.

On a typical area the composition is: Udorthents 55 percent; Urban land 20 percent; and contrasting inclusions 25 percent. The areas of the soil and Urban land are so intermingled that they can not be separated at the scale selected for mapping.

Typically, the Udorthents have a strong brown channery silt loam surface layer about 10 inches thick. The substratum to a depth of 50 inches is yellowish brown channery silty clay loam. Beneath is siltstone bedrock.

The natural fertility and the organic matter content are low. Permeability varies widely because of the nature of the materials. The available water capacity is moderate or low. On most areas either the depth of the mixed material is 20 to 40 inches or about 10 inches or more of the natural soil was removed. Depth to bedrock ranges from 40 to 72 inches or more.

Contrasting inclusions in this map unit are areas of Gilpin and Shelocta soils along with small areas of shallow, loamy soils. Narrow, steeper sloping areas, or nearly vertical escarpments consisting of soil, bedrock, and rubble can occur where cutting or filling was performed. The Gilpin and Shelocta soils make up about 20 percent and the shallow, loamy soils make up about 5 percent of this complex.

Most areas of this complex are used for urban and rural development.

These areas are poorly suited to urban and rural development; however, better suited areas generally are not available. Depth to bedrock in some places and slope on most areas are soil limitations when considering shallow excavations, dwellings with or without basements, roads or streets, and lawns. On most areas the land can be shaped to modify the slope. Roads, streets, dwellings, and small commercial buildings can be designed according to the slope. The slope can also affect the ease of using machinery during construction. Because of the slope there is a hazard of erosion during and after construction until permanent vegetation is established. The depth to bedrock can affect the ease of digging, filling, and shaping during construction. In places, heavy equipment or blasting is needed. Where septic tank absorption fields are used, the areas that do not have bedrock within a depth of 72 inches are best suited. In places, low strength is an additional limitation where local roads and streets are constructed. Gravel or other suitable material can be added to provide a suitable base and to improve traffic supporting capacity.

Except for slope, the soil conditions generally are favorable for establishing lawns and other landscaping plants as well as for growing garden crops. Less favorable conditions commonly are caused from a large number of small stones, excessive compaction during grading and smoothing, limited rooting depth, removal of the surface soil, or various combinations of these factors. Species that are tolerant of acid, infertile, and often droughty conditions are best suited. With adequate lime, fertilizer, and water most commonly grown lawn and landscaping plants can be used. Additional practices that help to assure a successful seeding on areas that are less favorable are incorporating organic matter such as bark and mulching. In places, excessive amounts of stones, shallow soil depth, or short steep slopes can affect the ease of establishing and maintaining lawns. A better suited topsoil material can be added or a ground cover can be used.

Wildlife habitat in urban areas can be improved by providing food, cover, and places to nest or den. Many shrubs and trees furnish food. Wooded areas on steep slopes and along streams can be maintained. Field borders around parks, cemeteries, and utility rights-of-way can provide habitat diversity. Certain grass and wildflower species can provide an alternative ground cover to manicured lawns as well as wildlife benefits. Nesting and denning structures can be built.

This complex is not assigned a capability classification.

W—Water

This map unit consists of areas inundated with water for most of the year and generally includes rivers, lakes, farm ponds and sediment ponds.

No interpretations are given for this map unit. This unit is not assigned a capability subclass.

Ye—Yeager fine sandy loam, occasionally flooded

This very deep, well drained, nearly level soil is on flood plains along small streams. Slopes range from 0 to 2 percent. Most areas are nearly oval in shape and range from about 6 to 25 acres.

Typically, the Yeager soil has a brown and dark yellowish brown fine sandy loam surface layer about 13 inches thick. The substratum, to a depth of 80 inches, is yellowish brown sand in the upper part, stratified brown fine sandy loam and dark yellowish brown loamy fine sand in the middle part, and dark yellowish brown sand in the lower part. Some similar soils have a substratum which is moderately acid or slightly acid.

This soil is low in natural fertility and low in organic matter content. Permeability is moderately rapid or rapid. The available water capacity is low or moderate. The number of roots decreases gradually with depth and there are generally few roots below about 18 inches. Flooding on most areas is occasional with the flooding interval ranging from about 5 to 50 times in 100 years. These floods are of brief duration. The depth to bedrock is 60 inches or more.

Contrasting inclusions in this map unit are small areas of Pope, Philo, and Craigsville soils on similar landscapes and small areas of Allegheny or Shelocta soils on stream terraces. Commonly, the Craigsville soil is on small alluvial fans and footslopes. Pope and Philo soils are coarse-loamy. These soils make up about 15 percent of the map unit.

Most areas of this soil are used for growing pasture and hay. Some areas are used for growing corn and garden crops. A few areas that were once cleared and used for farming have reverted to woodland.

This soil is well suited to crops such as corn and tobacco, as well as the commonly grown garden crops. Soil management concerns are susceptibility to compaction and maintaining tilth and fertility. Some areas are subject to scour and deposition caused by runoff from adjacent hill slopes. This runoff can be carried around the field with diversion terraces or across the field in waterways. This soil has good tilth and can be worked throughout a wide range of moisture conditions. Conservation tillage and the use of cover crops, lime, and fertilizer help keep the soil in good tilth and fertility. The kind and amounts of lime and fertilizer needed can be determined by soil test levels and the needs of the crop.

This soil is well suited to grasses and legumes. Maintaining fertility and the hazard of flooding are the main soil management concerns. Other management concerns are preventing overgrazing and maintaining a good stand. Overgrazing causes compaction and loss of stand. Proper stocking rates, pasture rotation, deferred grazing, and adequate fertility help keep the pasture and soil in good condition.

This soil is well suited to growing trees. Productivity is high. An average stand of yellow-poplar growing on this soil would reach a height of about 90 feet in 50 years under fully stocked, unmanaged conditions. Some of the more common species are yellow-poplar, sweetgum, and American sycamore. The main soil management concern is plant competition. Plant competition from the growth of undesirable species can be a problem due to the very favorable site conditions. A new forest crop can be established by clearing and disking, using herbicides, or by managing the existing stand.

Openland wildlife habitat potential is fair and can be maintained and improved by providing food, cover, and places to nest or den. Field borders create natural wildlife areas. Trees and brush along the stream provide benefits to wildlife as well as erosion control. Brush piles or other nesting structures can be built.

This soil generally is unsuited to building site development due to occasional flooding. Following guidelines and restrictions for building in a flood-prone area may reduce this hazard.

This soil is in capability subclass IIw.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 15,051 acres in the survey area, or nearly 5 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in the Pope-Shelocta-Gilpin general soil map unit, which are described under the heading "General Soil Map Units." About 2,000 acres of this prime farmland are used for crops.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed at the end of this section. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

The map units that meet the requirements for prime farmland are:

Ag	Allegheny loam, rarely flooded
AlB	Allegheny loam, 2 to 6 percent slopes
BaB	Barbourville loam, 2 to 8 percent slopes
Bo	Bonnie silt loam, occasionally flooded (where drained)
Ca	Cotaco loam, rarely flooded
CoB	Cottonbend loam, 2 to 6 percent slopes
LoB	Lonewood loam, 2 to 6 percent slopes
Ph	Philo fine sandy loam, rarely flooded
Pl	Philo fine sandy loam, occasionally flooded
Po	Pope loam, rarely flooded
Pp	Pope loam, occasionally flooded
Pr	Pope fine sandy loam, occasionally flooded
ShB	Shelocta gravelly silt loam, 2 to 6 percent slopes
Sn	Stendal silt loam, occasionally flooded (where drained)
St	Stokly fine sandy loam, occasionally flooded (where drained)
Ye	Yeager fine sandy loam, occasionally flooded

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, trees, and shrubs.

Crops and Pasture

J. David Stipes, agronomist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Kentucky Cooperative Extension Service.

Less than 2 percent of the survey area is used for crops and pasture. Of this total, about one-third is used for crops, mainly corn, hay, and some tobacco. Other crops are vegetables, small fruits, tree fruits, and nursery plants. A small acreage is used for tomatoes, strawberries, blackberries, melons, sweet corn, peppers, cabbage, or other vegetables or small fruits. Apples and peaches are the most important tree fruits grown in the survey area. The acreage used for crops and pasture has steadily decreased in the past 20 years. Most steep hillsides once used for corn or pasture have reverted to woodland and other areas have been converted to urban uses. About 13 percent of the farmsteads were abandoned between 1982 and 1987 (Kentucky Agricultural Statistics Service 1990).

The potential of the soils for increased production is fair. Nearly 15,051 acres in the survey area qualifies as prime farmland. An additional 2,270 acres is suited to crop production, including some sloping areas where adequate protection from soil erosion is

needed. About 4,000 acres of hilly land is best suited to pasture and hay. Another 10,000 acres has favorable topography but may have surface stones or boulders that hinder its use as pasture or hayland. Fairpoint and Bethesda soils, which are in large areas that have been surface mined for coal, make up about three-fourths of the 10,000 acres.

Production also can be increased by extending the latest crop production technology to all of the cropland in the survey area. Differences in suitability and management result from differences in soil characteristics, such as fertility, erodability, organic matter content, and availability of water for plant growth, drainage, and flooding. Cropping systems, tillage, and field size also are important parts of management. This section describes the general principles of soil management that can be applied widely within the survey area.

On slopes of more than about 2 percent, soil erosion is a major concern. Loss of the surface layer reduces the fertility and available water capacity and results in poor tilth. Erosion is especially harmful to soils such as Gilpin and Sequoia, which have a root restricting layer within about 40 inches of the surface. Although important, erosion is less harmful on soils that have little restriction to rooting, such as Allegheny and Cottonbend soils. Applications of fertilizers on these soils help to offset the losses in fertility caused by erosion, but many of the losses resulting from erosion are difficult or impractical to correct. Controlling erosion reduces the pollution of streams by sedimentation. Water quality is improved for farm and city uses, for wildlife habitats, and for recreational uses.

Erosion control practices provide a protective cover of crop residue or vegetation. Properly managed permanent pasture or hay can provide 80 percent or more of the protection needed. Crop rotations that alternate cultivated crops and meadows help to control erosion. Applying a system of conservation tillage that leaves a protective cover of crop residue on the surface throughout the year can reduce sheet erosion by one half or more, as compared to fall plowing with a moldboard plow.

No-tillage systems which leave nearly all of the crop residue on the soil surface reduce the hazard of erosion. No-tillage and conservation tillage systems are being used in Clay County. Contouring and contour stripcropping can be used on fields that have smooth uniform slopes. Terraces that divert the surface runoff to safe outlets can be used in some fields. The use of conservation practices on highly erodible land (HEL) used for cropland has increased due to USDA compliance provisions.

Parallel terraces can be farmed much more easily than contour terraces. Deep and very deep soils that have few or no root-restricting characteristics such as Allegheny and Shelocta soils, are better suited to terraces than soils that have bedrock near the surface, such as Gilpin and Sequoia soils. On the more shallow soils, the possible losses caused by exposing small infertile areas should be considered when the depth of cut and the design of the terrace system are determined.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils that have good tilth have surface horizons that are granular and porous. In the upland areas of Clay County, most soils used for cultivated crops have a surface layer of silt loam or loam that is low in organic matter content. Examples are Gilpin, Lonewood, Sequoia, and Shelocta soils. Generally, tilling of these soils weakens the structure and increases compaction and surface crusting. Tilling when the soils are too wet can further increase the degree of compaction, even below the plow layer. Subsoiling and varying depth of plowing minimize compaction and the formation of traffic pans. Regular additions of crop residue, barnyard manure, and other organic material improve tilth and minimize surface crusting.

Most of the soils on the flood plains in the survey area have a surface layer of fine sandy loam or loam that is moderate or high in organic matter content. These soils retain favorable tilth under normal tillage operations. They are susceptible to compaction beneath the tillage zone. In some areas of Craigsville soils excessive gravel in the plow layer restricts tillage.

Stones and boulders are a common feature in many of the colluvial soils in the survey area. In some places, these soils cannot be tilled because they have too many stones and boulders. In other places the stones and boulders can be removed.

Soil fertility is medium in most of the soils on the flood plains and low in the soils on the uplands. Almost all of the upland soils in the area have excessive levels of soil acidity in the upper part of the root zone. Applications of lime are needed to raise the pH level of these soils for adequate growth of most crops. Most of the soils on the flood plains are naturally acid, but the levels may or may not affect crop growth in a given year. On all soils, the amount of lime and fertilizer used should be based on the results of soil tests, needs of the crops, and the expected level of yields. The Cooperative Extension Service can help determine the kind and amount of lime and fertilizer to be applied.

Organic matter is important as a source of nitrogen for crop growth. Also, it helps to maintain good tilth and

the rate of water infiltration. The content of organic matter is low in most of the cultivated soils of the uplands and moderate in the soils of the flood plains. The soils throughout the survey area have low levels of phosphorus and low or moderate levels of potassium unless heavy applications of fertilizer have been applied.

The soils along the river bottoms are occasionally or rarely flooded. Flooding generally is in the period from about December to June and is of brief duration. Flash flooding as a result of intensive rainfall can occur at upper or lower elevations of drainage basins at any time of the year.

In soils that have a high water table, a drainage system is needed to reduce wetness during the growing season. Surface ditches or tile drains can be used if suitable outlets are available. In some areas of the poorly drained soils, suitable outlets are not available. Even where outlets are available, drainage of some poorly drained soils is usually not completely satisfactory. As a result these soils are best suited to pasture or wetland wildlife habitat. Before draining or altering the natural conditions of soils classified as hydric such as Bonnie, land users should consult the Natural Resources Conservation Service or other appropriate agency for an official wetland determination.

Pasture and Hayland

Pasture and hayland are important land uses in the survey area. A successful livestock program depends on a forage program that can supply large quantities of homegrown feed of adequate quality. Such a program can furnish up to 78 percent of the feed for beef cattle and 66 percent for dairy cattle. In the survey area, it was estimated that about 2,900 acres are used for hay and pasture.

The soils in the survey area vary widely in their ability to produce forage because of differences in depth to bedrock, internal drainage, ability to supply moisture, and many other properties. Grasses and legumes and grass-legume combinations vary widely in their ability to persist and provide forage on different soils. Selecting the plant species or mixture of species best adapted to the specific soil conditions results in improved forageable yields while conserving soil and water resources.

Nearly level to sloping, deep or very deep, well-drained land should be planted to the highest producing forage species such as alfalfa, a mixture of alfalfa and orchard-grass, or alfalfa and timothy. Sod-forming grasses such as tall fescue or bluegrass are needed to minimize soil erosion on the steeper surfaces. Alfalfa can be used with a cool-season grass where the soils are at least 2 feet deep and well drained. On soils less than 2 feet deep, or not well drained, clover-grass mixtures or pure grass stands should be used. Legumes can be established through renovation in sod that is dominated by grasses.

Plants should be selected according to the kind of soil and the intended use. The plants selected should be those that provide maximum quality and versatility in the forage program. Legumes generally produce higher quality feed than grasses and should be used to the maximum extent possible. The taller legumes, such as alfalfa and red clover, are more versatile than other legumes, such as white clover, which is used primarily for grazing. Grasses such as orchard grass, timothy, and tall fescue are better suited to hay and silage.

Tall fescue is an important cool-season grass that is suited to a wide range of soil conditions. It is used for both pasture and hay. Plant growth occurring from August to November is often left uncut for deferred grazing during late fall and winter. Nitrogen fertilizer is needed for maximum production during the rest period. The desired production levels should determine the rates of application.

On some of the pasture or hayland in the survey area, re-establishment is needed. In many areas renovation or other improvements, such as brush control and protection from overgrazing, are needed. Renovation is one way to increase the yields of pasture and hay fields and maintain a good stand of grasses. It improves the fields by partial destruction of the sod followed by applications of lime and fertilizer and seeding to reestablish desirable forage plants. Including legumes in the grass fields provides high-quality feed and reduces the need for nitrogen fertilizer. Intensive grazing practices are being used to accommodate larger stocking rates.

Additional information about pasture and hayland management is available at the local office of the Natural Resources Conservation Service or the Kentucky Cooperative Extension Service.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and

results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation (USDA 1961).

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 and IIIe-6

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of the map units in this survey area is given in the section “Detailed Soil Map Units” and in the yields table.

Woodland Management and Productivity

Charles A. Foster, forester, Natural Resources Conservation Service, helped prepare this section.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

In the table, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table, and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The potential productivity of common trees on a soil is expressed as a site index and a volume number. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands. The site indices in table 7 are based on regional studies (Beck 1962; Coile and Schumacher 1953; Doolittle 1960; Nelson and others 1961; Olson 1959)

The *volume* is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year, calculated at the age of culmination of mean annual increment.

Trees to plant are those that are used for reforestation or under suitable conditions, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired

product, topographic position (such as low, wet areas), and personal preference are three factors among many that can influence the choice of trees for use in reforestation.

Clay County is in the mixed mesophytic forest region of the eastern deciduous forest (Braun 1942). Steep hillslopes make up about 85 percent of the survey area, and with the exception of areas recently surface mined for coal, they are forested. Maple, beech, yellow-poplar, oak, and hickory are the dominant tree species.

Most of the forestland is in private holdings. About 70,000 acres is administered by the Daniel Boone National Forest, Redbird Purchase Unit. Most of the National Forest land is in the Shelocta-Cloverlick-Highsplint general soil map unit.

There are several small sawmills operating at the present. Products such as rough-sawn boards, mine props, shims, and blocking are cut at several small mills. Mine props and fuelwood are cut by many landowners. Markets for much of the low-quality hardwoods are insufficient to justify much production.

Forest Species

The presettlement forest in the area of Nolans Branch of the Redbird River was mixed stands of American beech, yellow-poplar, American chestnut, chestnut oak, and sugar maple (Braun 1942). In the mixed mesophytic forest association, a number of species generally are in a stand of trees. Common species include sugar maple, yellow-poplar, black locust, yellow buckeye, and basswood. Other species are northern red oak, red maple, white oak, chestnut oak, cucumbertree, American beech, eastern hemlock, black cherry, birch, magnolia, and hickory.

Oak forests are on the drier sites, such as the south- and west-facing sides of the hills and the tops of hills. Common species include chestnut oak, scarlet oak, white oak, red maple, blackgum, and hickory.

Oak-pine forests are on some of the drier sites. Pitch pine, Virginia pine, and shortleaf pine are mixed with the oaks.

Soil and Tree Relationships

Soils help to provide a basic understanding of the distribution of tree species in the landscape and their growth. Some of these relationships are readily recognized; for example, yellow-poplar grows well on deep or very deep, moist soils and chestnut oak or pine is common where the rooting depth is restricted or the moisture supply is limited. The soil serves as a reservoir for moisture, provides an anchor for roots, and supplies most of the available nutrients. Soil properties that either directly or indirectly affect these growth requirements include organic matter content, reaction, fertility, drainage, texture, structure, depth, and position on the landscape. Elevation and aspect are of particular importance in hilly areas.

Available water capacity is primarily influenced by texture, organic matter content, rooting depth, and content of rock fragments. In this area it is likely that available water capacity limits tree growth only in the shallow soils. This is due to the fairly even and abundant summer rainfall in the area. Although little can be done to change the physical limitations of the soil, timber stand improvement and thinning are useful in management.

All but the very shallowest soils in this area provide an adequate anchor for tree roots. The susceptibility to windthrow or the upsetting of trees by wind is not a major soil management concern on most soils in the area.

Nutrient supply also affects tree growth. The role of the mineral horizons in the soil is important. Mineralization of the humus releases nitrogen and other nutrients. Calcium, magnesium, and potassium are held by the humus, and clay particles and very small amounts of these nutrients are made available by the weathering of clay, sand, and silt particles and rock fragments. Most of the soils in the uplands have been leached and contain only small amounts of these nutrients, except in the surface layer. Where the surface layer is thin as in the Shelocta and Gilpin soils, careful management is needed during site preparation to ensure that the surface layer is not removed or degraded.

The living plant community is also a part of the nutrient reservoir. Decomposition of leaves, stems, and other organic matter recycles nutrients that have accumulated in the forest ecosystem. Fire, excessive trampling by livestock, soil erosion, and harvest method can result in the loss of these nutrients. Forest management should include prevention of wildfire and protection from overgrazing.

Other site characteristics that affect tree growth are aspect and position in the landscape. These influence such factors as the amount of sunlight (or energy) available, air drainage, soil temperature, and moisture retention. North-facing and east-facing (cool) slopes are better sites for tree growth in this area than are south-facing and west-facing (warm) slopes. Differences in site index can be as much as 10 feet. Most soils on the cool slopes have thicker A horizons that contain more humus and clay as compared to the soils on the warm slopes. Examples of soils on cool slopes are Cloverlick and Kimper. These soils have a slightly higher capacity to hold

water and a much higher capacity to hold nutrients than the soils on warm side slopes. Mean annual soil temperature is about 2 degrees F lower on the cool slopes. Most of this difference is during the dormant season. The air temperature in the canopy is lower on the cool slopes, since less sunlight falls on the canopy. This results in lower transpiration demand and water requirement.

Soils on lower slopes may receive additional water because of internal water flow. On the very steep uplands much of the water movement during periods of saturation occurs as lateral flow within the subsoil.

Soil and air temperatures are lower on upper slopes than on lower slopes. The decrease is about 1 degree F for each 550 feet change in elevation. Soils at the base of warm slopes and the soils on the adjacent cool slopes are similar because of the shading effect of the ridge and possibly because of cool air drainage. These similar soils are mapped together.

Nutrients, water, and position on the landscape largely determine which tree species grow on a particular soil. For example, sugar maple-basswood forest is on soils with the highest fertility levels and high moisture content (Muller 1982). Beech grows on soils of high moisture content and intermediate fertility levels. Chestnut oak-red maple forests are on the soils of low fertility levels and low moisture content. In this survey area, scarlet oak-pine forest is on soils with very low fertility levels and very low moisture content.

Recreation

The recreational facilities in Clay County include swimming pools, golf courses, hunting and fishing areas, campgrounds, ball fields, game courts, trails, historic sites, and picnic areas.

Because of the scenic qualities and the small amount of surface mining, the Shelocta-Cloverlick-Highsplint general soil map unit is well suited to extensive recreation areas. Most of the Red Bird Purchase Unit of the Daniel Boone National Forest is in this map unit. Combs Lake and the Beech Creek Wildlife Management Area are east of Manchester and together make up about 232 acres.

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In the table, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty

when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Raymond E. Toor, biologist, Natural Resources Conservation Service, helped prepare this section.

Clay County has a valuable commodity in its fish and wildlife resources. Streams, rivers, and man-made impoundments provide the habitat for fish and waterfowl. Habitat for wildlife is found throughout the area.

Many of the soils in Clay County are suitable as sites for impounding water. Ponds, small streams, and large impoundments are stocked and managed for largemouth bass, smallmouth bass, channel catfish, bluegill, walleye, stripped bass, and rainbow trout. Bear Creek, Beech Creek, Bullskin Creek, Buzzard Creek, Elk Creek, Goose Creek, Horse Creek, Jacks Creek, Mill Creek, Sextons Creek, and Teges Creek are major tributaries. The South Fork of the Kentucky River, South Fork of the Rockcastle River, and the Redbird River are the only major rivers in the survey area. Combs Lake is the only major constructed impoundment in the survey area.

Very little aquaculture exists in Clay County. Expansion of aquaculture will depend upon adequate water supply, improvement of water quality, and marketing.

The major game species of wildlife in the survey area include the white-tail deer, gray squirrel, cottontail rabbit, bobwhite quail, mourning dove, ruffed grouse, raccoon, and gray and red fox. Eastern wild turkey are being reintroduced into the county.

Waterfowl are commonly found in the area during the migration period. These species include mallards, teal, widgeon, and Canada geese. Wood ducks are the more permanent waterfowl residents, nesting in the survey area.

Successful management of wildlife on any tract of land requires that food, cover, and water are available in a suitable combination. Lack of any one of these necessities, an unfavorable balance among them or inadequate distribution of them may limit the reproduction dissemination of desired kinds of wildlife. Soils information provides a valuable tool in creating, improving, or maintaining suitable habitat for wildlife. Soil interpretations for wildlife habitat aid in selecting the more suitable sites for management of desired wildlife species. Soil interpretations indicate the intensity of management needed in order to achieve satisfactory results. They also indicate why certain areas are undesirable for management of a specific wildlife species. Interpretations can be used in broad scale planning of wildlife management areas, parks, and nature areas, or for acquiring wildlife lands.

In table 9 the soils of Clay County are rated for the potential creation, improvement, or maintenance of seven different wildlife habitats. These ratings are based on the limitations imposed by the characteristics or behavior of the soil.

The potential of the soil is rated good, fair, poor or very poor. A rating of good indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management and satisfactory results can be expected. A rating of fair indicates that the element or kind of habitat can be established, improved or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of poor indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved or maintained in most places, but management is difficult and must be intensive. A rating of very poor indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses

and legumes are orchardgrass, timothy, Kentucky bluegrass, white clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, aster, tickclover, and cinquefoil.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, yellow-poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, walnut, blackberry, blueberry, and strawberry bush. Examples of fruit-producing shrubs that are suitable for planting on soils rated good are Russian-olive, autumn-olive, and crabapple

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are Virginia pine, white pine, eastern hemlock, and redcedar.

Wetland plants are annual and perennial, wild herbaceous plants that grow on wet or moist sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, cattail, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, ponds, and constructed wetlands.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas includes bobwhite quail, meadowlark, field sparrow, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy, or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, muskrat, mink, and beaver.

Land used for cropland, pastureland, or woodland also furnishes quality habitat for many kinds of wildlife when certain practices are applied: These practices include planned crop rotation, crop residue management, fallow spring disking of idle field borders, stripmowing, and leaving small areas of unharvested grain next to good cover.

Conservation practices such as carefully planned mechanical mowing, deferred grazing, prescribed grazing systems, selective brush management, and maintaining brush field borders are often beneficial to wildlife on improved pastureland.

Other practices employed in woodland areas which are beneficial to wildlife include clearing and thinning selectively; planting winter annuals on pipeline right-of-ways, firebreaks, and in open areas; and protecting den trees and quality mast-producing trees.

Some practices are harmful to wildlife. Those include indiscriminate burning and use of chemicals for killing weeds and insects, heavy grazing, clean fall plowing, clear cutting of timber, draining of wetland depressions, and removal of all den and mast producing trees.

Proper application of conservation practices must be based on the habitat needs of the wildlife to be managed. When arbitrarily applied, many of these practices could be detrimental rather than beneficial. When managing for game species, many nongame species also generally benefit. Trained professionals from the Natural Resources Conservation Service, Kentucky Department of Fish and Wildlife Resources, or Kentucky Agricultural Extension Service can provide technical assistance in planning or application of needed wildlife management practices.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The

ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

Most of the soils on steep or very steep slopes can be unstable due to natural or man induced occurrences. Likewise, the underlying shale and siltstone strata can be unstable when exposed. Landslide scars or rotational slumps have occurred in the past and exist on many of the steep slopes. Steep manmade excavations, such as those on road cuts and surface mines, increase the chance of landslides or slumps. Shale and siltstone layers that are exposed by excavations or as a result of a landslide will begin to weather and eventually the highly weathered material on the surface will begin to slough.

Heavy rainfall events can cause unstable soil and rock material to move down the slopes as a mud flow or debris avalanche. This type of soil and rock movement usually begins in or near the drainage patterns on the sides of steep slopes. Areas. such as the upper part of alluvial fans, may be in the path of these types of soil and rock movement. Eventually material is deposited on the flatter slopes at the toe of the hillside, sometimes on a flood plain.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of

digging, filling, and compacting is affected by the depth to bedrock, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking, and swelling can cause the movement of footings. A high water table, depth to bedrock, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and,

generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10.

They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope, and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. Low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 18.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates

determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on the basis of measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture

content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, or very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep, deep, or very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in the table, the first letter is for drained areas and the second is for undrained areas.

In table 16, Bonnie soil is assigned to two hydrologic soil groups. Soils that have a seasonal high water table but can be drained are assigned first to a hydrologic group that denotes the drained condition of the soil and then to a hydrologic group that denotes the undrained condition, for example C/D. Because there are different degrees of drainage and water table control, onsite investigation is needed to determine the hydrologic group of the soil in a particular location.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

The table gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil

profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in the table are the depth to the seasonal high water table; the kind of water table—that is, perched, apparent, or artesian; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of several typical pedons in the survey area are given in table 17. The data are for soils sampled at carefully selected sites. Unless otherwise indicated, the pedons are typical of the series. They are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by Kentucky Agricultural Experiment Station, Lexington, Kentucky.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (USDA 1984).

Sand—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1).
Extractable cations—ammonium acetate pH 7.0, atomic absorption; calcium (6N2e), magnesium (6O2d), sodium (6P2b), potassium (6Q2b).
Extractable acidity—barium chloride-triethanolamine IV (6H5a).
Cation-exchange capacity—ammonium acetate, pH 7.0, steam distillation (5A8b).
Base saturation—ammonium acetate, pH 7.0 (5C1).
Base saturation—sum of cations, TEA, pH 8.2 (5C3).
Reaction (pH)—1:1 water dilution (8C1f).

Selected Diagnostic Properties

Some soil properties are readily observed or measured. Other properties may need to be observed for a long period of time or may require expensive or time-consuming laboratory measurement. In this section selected properties useful to the classification of the soils in the area are summarized. These summaries are based on the data from 31 soil profiles sampled for laboratory analysis in Clay County and on data from similar soil survey areas in the region. Sources of other data are given.

Soil temperature.—The temperature of the soil affects biological activity and the chemical and physical processes in the soil. For example, below about 41 degrees F, root growth for most plants and seed germination are impossible. The temperature of the soil varies with the air temperature but is not subject to as much day-to-day fluctuation. The average annual soil temperature is related to the average annual air temperature but is affected to some extent by rainfall, snow cover, shade, fog, leaf litter layers in forests, slope aspect, and gradient. The soil temperature is not uniform throughout the year but changes with the seasons.

Data from Bell County, an adjacent county to the south, show that soil temperature varies with elevation and aspect (Childress 1992). At two sites the north or northeast aspect was cooler than the south or southwest aspect. This difference was the greatest during the dormant season. The soils averaged about 3 degrees F cooler at 3,820 feet than at 2,040 feet elevation. These data agree with other temperature studies (Franzmeier and others 1969).

Particle-size distribution.—The fine-earth is commonly sandy loam, loam, or silt loam. A few samples were loamy sand, clay loam, silty clay loam, or silty clay. Sand contents were mostly between 20 and 65 percent, and clay contents were between 8 and 38 percent. Sandier soils contain less clay than soils where the content of sand is low.

Clay minerals.—In Pike County, Kentucky, and Boone and Wyoming Counties, West Virginia, clay mineralogy determinations have been made from selected horizons of soil pedons. Kaolinite and mica were identified in every sample. Most samples also contained vermiculite. Several samples contained vermiculite-chlorite, lepido-crocite, or vermiculite with varying amounts of hydroxy-interlayering. The amount of kaolinite, as determined by DTA, ranged from 2 to 26 percent. These findings are comparable to a study in McCreary County, Kentucky, and Morgan County, Tennessee, to the southwest of this area (Franzmeier and others 1969). In this study vermiculite, mica, interstratified vermiculite with varying amounts of hydroxy-interlayering, and kaolinite, along with trace amounts of quartz and lepidocrocite, were identified. Kaolinite, as determined by DTA, ranged from 15 to 35 percent.

Minerals in the sand and silt.—Quartz is the dominant mineral in both the sand and silt fractions and ranges from about 50 to 100 percent. The quartz content is lowest in soils that formed in shales, siltstones, and sandstones of the Breathitt Group and highest in soils that formed in quartzose sandstones of the Lee Formation. Other minerals present are muscovite, biotite, potassium feldspar, mica, and chlorite. Also present in some soils are trace amounts of zircon and tourmaline. Soils with high potassium feldspar content can supply sufficient potassium for growing many crops. Mica, muscovite, and biotite also supply some potassium, but the rate of release is too slow for most crops. Quartz, zircon, and tourmaline are very resistant to weathering and do not supply any plant nutrients.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. At the time this survey was completed, eleven soil orders were recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol.* An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, acid, mesic Typic Fluvaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Description of Great Groups and Subgroups

In this section the great groups and subgroups in the survey area are discussed. They are presented according to their highest category—the order. The orders are arranged by increasing pedogenic development. Also, the soil series in each subgroup are listed, along with important properties used at the family level. Three soil orders are identified in Clay County. They are Entisols, Inceptisols, and Ultisols.

Entisols.—These soils have been little affected by soil forming processes and do not have distinct pedogenic horizons, other than a thin A horizon.

Fluvaquents.—These are very deep, somewhat poorly drained or poorly drained soils with a thin A horizon. Aeric and Typic Fluvaquents in Clay County are fine-silty or coarse-loamy and have mixed

mineralogy. They include the Bonnie, Stendal, and Stokly series in wet, swampy places on flood plains. They are inextensive.

Udifluvents.—These are very deep, well drained soils with a thin A horizon. Typic Udifluvents in Clay County are sandy and have mixed mineralogy. They include the Yeager series on flood plains. They are inextensive.

Udorthents.—These are deep or very deep, well drained soils with a very thin A horizon. The Udorthents in areas of cut and fill associated with urban land were not classified below the great group. Typic Udorthents in Clay County are loamy-skeletal or fine-loamy and have mixed mineralogy. They include the Fairpoint and Bethesda series and are primarily in areas that have been surface mined for coal.

Inceptisols.—These soils have cambic horizons and display more pedogenic development than Entisols. The cambic horizon is a subsurface layer that displays pedogenic development in the form of structure or by having more clay or brighter colors than the underlying horizon. The horizon may display all of these features.

Dystrochrepts.—These are deep or very deep, moderately well drained to somewhat excessively drained soils. Most of these soils have a thin A horizon. The subsoil generally is yellowish brown. Typic Dystrochrepts in Clay County are loamy-skeletal and have mixed mineralogy. They include the Highsplint series in upland areas. Fluvaquentic and Fluventic Dystrochrepts in Clay County are coarse-loamy or loamy-skeletal and have mixed mineralogy. They include the Craigsville, Philo, and Pope series on flood plains. Umbric Dystrochrepts have a moderately thick A horizon. The subsoil generally is dark yellowish brown in the upper part and yellowish brown in the lower part. In Clay County these soils are fine-loamy or loamy-skeletal and have mixed mineralogy. They include the Cloverlick and Kimper series on moist uplands.

Haplumbrepts.—These are very deep, well drained soils with a thick subsoil. Typic Haplumbrepts in Clay County are fine-loamy and have mixed mineralogy. They include the Barbourville series on alluvial fans and footslopes.

Ultisols and Alfisols.—These soils have argillic horizons that exhibit clay translocation. Ultisols are leached to a greater degree than are the Alfisols. They also have a lower base saturation than the Alfisols.

Hapludults.—These are moderately deep to very deep, moderately well drained or well drained soils with a thin A horizon and a thin or moderately thick subsoil. The subsoil generally is yellowish brown. Typic Hapludults in Clay County are fine-loamy or clayey and have mixed or siliceous mineralogy. They include the Allegheny, Gilpin, Lonewood, Sequoia, and Shelocta series on uplands and stream terraces. Aquic Hapludults in Clay County are fine-loamy and have mixed mineralogy. They include the Cotaco series on stream terraces and footslopes.

Paleudults.—These are very deep, well drained soils with a light colored A horizon and a thick subsoil. Typic Paleudults in Clay County are fine-loamy and have siliceous mineralogy. They include the Cottonbend series on structural benches or high stream terraces.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetical order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA 1975) and in "Keys to Soil Taxonomy" (USDA 1992). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Allegheny Series

The Allegheny series consists of very deep, well drained soils on stream terraces and alluvial fans. Permeability is moderate. These soils formed in loamy alluvium. Slopes range from 0 to 12 percent. Allegheny soils are fine-loamy, mixed, mesic Typic Hapludults.

Allegheny soils are associated on the landscape with the Barbourville, Cotaco, Shelocta, and Lonewood soils. Barbourville soils have an umbric epipedon and are found on footslopes. Cotaco soils are moderately well drained. Shelocta soils lack water worn pebbles and are found on side slopes and footslopes. Lonewood soils have siliceous mineralogy and are found on ridgetops and structural benches.

Typical pedon of Allegheny loam, 2 to 6 percent slopes; on a 5 percent slope in a meadow of

bluegrass, tall fescue, and orchardgrass; 1,900 feet northwest of the bridge (Trixie Road) over the South Fork of the Kentucky River, about 0.7 mile southeast of Trixie; Oneida quadrangle; Kentucky coordinates 2,605,450 feet east and 367,800 feet north:

Ap—0 to 8 inches; brown (10YR 5/3) loam; weak medium granular structure; friable; many fine roots; common fine pores; strongly acid; abrupt smooth boundary.

Bt1—8 to 25 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; few faint clay films on faces of peds and in pores; strongly acid; clear smooth boundary.

Bt2—25 to 44 inches; yellowish brown (10YR 5/6) loam; common medium distinct yellowish brown (10YR 5/8) mottles; moderate fine subangular blocky structure; firm; few fine roots; common fine pores; common distinct clay films on faces of peds; common silt coatings; few fine prominent black (10YR 2/1) iron and manganese stains on faces of peds; strongly acid; clear smooth boundary.

Bt3—44 to 56 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; firm; few fine pores; common distinct clay films on faces of peds; common medium distinct light gray (10YR 7/2) iron depletions on the faces of peds; few prominent black (10YR 2/1) iron and manganese stains on faces of peds; strongly acid; gradual smooth boundary.

BC—56 to 80 inches; yellowish brown (10YR 5/8) loam; weak medium subangular blocky structure; firm; few fine pores; many medium distinct light gray (10YR 7/2) iron depletions on the faces of peds; strongly acid.

Thickness of the solum is 30 to 80 inches or more. Depth to bedrock is 60 inches or more. Rock fragments range from 0 to 15 percent in the A and B horizons, and from 0 to 35 percent in the C horizons. Reaction is strongly acid to extremely acid, unless the soil is limed.

The A or Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Fine-earth texture is loam.

Some pedons have a BA horizon with hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 4 to 8. Fine-earth texture is loam or silt loam.

The Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 4 to 8. Redoximorphic features are in shades of brown, gray, red, or yellow. Fine-earth texture is clay loam, sandy clay loam, loam, silt loam, or silty clay loam.

The BC horizon has color and texture range similar to the Bt horizon. Redoximorphic features are in shades of brown, gray, yellow, or olive.

Some pedons have a C horizon with color range similar to the BC horizon. The fine-earth is fine sandy loam, loam, sandy clay loam, or clay loam.

Barbourville Series

The Barbourville series consists of very deep, well drained soils on alluvial fans and footslopes. Permeability is moderately rapid. These soils formed from sandstone, siltstone, and shale. Slopes range from 2 to 8 percent. Barbourville soils are fine-loamy, mixed, mesic Typic Haplumbrepts.

Barbourville soils are associated on the landscape with Allegheny, Cotaco, and Shelocta soils. Allegheny soils have an argillic horizon and lack an umbric epipedon. Cotaco soils are moderately well drained, have an argillic horizon and lack an umbric epipedon. Shelocta soils lack an umbric epipedon.

Typical pedon of Barbourville loam, 2 to 8 percent slopes; on a 4 percent slope in a tobacco field; 550 feet northeast of the confluence of Doar Branch and Crane Creek, about 2.2 miles west of Oneida; Oneida quadrangle; Kentucky coordinates 2,599,500 feet east and 347,450 feet north:

Ap—0 to 7 inches; dark brown (10YR 3/3) loam; brown (10YR 5/3) dry; weak medium granular structure; friable; few fine roots; common fine root channels; 5 percent gravel; strongly acid; clear smooth boundary.

A—7 to 16 inches; dark brown (10YR 3/3) loam; brown (10YR 5/3) dry; weak medium granular structure; friable; few fine roots; common fine root channels; 3 percent gravel; strongly acid; clear wavy boundary.

BA—16 to 20 inches; dark yellowish brown (10YR 4/4) loam; moderate fine subangular blocky structure; firm; few fine roots; common fine root channels; common distinct dark yellowish brown (10YR 3/4) organic coats on faces of peds and in pores; 3 percent gravel; very strongly acid; gradual smooth boundary.

Bw1—20 to 32 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; firm; few fine roots; common fine root channels; 3 percent gravel; very strongly acid; gradual wavy boundary.

Bw2—32 to 44 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; firm; few fine roots; common fine root channels; 3 percent gravel; very strongly acid; gradual smooth boundary.

Bw3—44 to 62 inches; yellowish brown (10YR 4/6) gravelly clay loam; common fine distinct light yellowish brown (10YR 6/4) mottles; weak fine subangular blocky structure; firm; few fine root channels; 20 percent gravel; very strongly acid; gradual smooth boundary.

BC—62 to 73 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak medium subangular blocky structure; friable; few fine root channels; 15 percent gravel; very strongly acid; gradual smooth boundary.

C—73 to 80 inches; yellowish brown (10YR 5/4) gravelly loam; massive; friable; few fine vesicular pores; 20 percent gravel; very strongly acid.

Thickness of the solum is 30 to 60 inches or more. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 10 percent in the A and BA horizons and from 15 to 35 percent in the Bw and C horizons. Reaction is moderately acid to very strongly acid, unless the soil is limed.

The A or Ap horizon has hue of 10YR or 7.5YR, value of 1 to 3, and chroma of 3 or less. Fine-earth texture is loam.

The BA horizon, when present, has hue of 10YR or 7.5YR, value of 3 to 6, and chroma of 3 or 4. Fine-earth texture is loam, silt loam, or sandy loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 6, and chroma of 3 or 4. Some pedons have mottles in shades of brown or gray below a depth of 20 inches. The fine-earth texture is loam, sandy clay loam, or clay loam.

The C horizon has colors and fine-earth textures like that of the Bw horizon.

Bethesda Series

The Bethesda series consists of very deep, well drained soils on ridgetops, structural benches, side slopes, stream terraces, and hollow fills. Permeability is moderately slow. These soils formed in stony, loamy acid regolith from surface mining of coal or other highly disturbed areas. Slopes range from 2 to 70 percent. Bethesda soils are loamy-skeletal, mixed, acid, mesic Typic Udorthents.

Bethesda soils are associated on the landscape with Fairpoint soils. Fairpoint soils are nonacid.

Typical pedon of Bethesda channery silt loam in an area of Fairpoint and Bethesda soils, 20 to 70 percent slopes; on a south-facing side slope, 55 percent slope in an area of tall fescue and small black locust trees; 5,000 feet southwest of the confluence of Little Beech Creek and Beech Creek, and 400 feet from the crest of the ridge; about 2.1 miles southwest of Tanksley; Barcreek quadrangle; Kentucky coordinates 2,589,900 feet east and 318,400 feet north:

A—0 to 4 inches; olive brown (2.5Y 4/4) channery silt loam; weak fine granular structure; friable; many fine roots; few fine pores; 15 percent channers; extremely acid; abrupt wavy boundary.

AC—4 to 8 inches; dark olive gray (5Y 3/2) channery silt loam; weak medium granular structure; friable; common fine roots; few fine pores; 20 percent channers; extremely acid; clear wavy boundary.

C1—8 to 23 inches; olive gray (5Y 4/2) very channery silty clay loam; massive; firm; 50 percent channers; extremely acid; gradual wavy boundary.

C2—23 to 46 inches; dark gray (5Y 4/1) very channery silty clay loam; massive; firm; 50 percent channers; extremely acid; gradual wavy boundary.

C3—46 to 60 inches; 50 percent dark gray (5Y 4/1) and 50 percent olive gray (5Y 4/2) extremely channery silty clay loam; massive; firm; common medium prominent yellowish brown (10YR 5/8) lithochromic mottles; 65 percent channers; extremely acid; gradual smooth boundary.

C4—60 to 80 inches; olive gray (5Y 4/2) and strong brown (7.5YR 5/8) extremely channery silty clay loam; massive; very firm; 65 percent channers; extremely acid.

Thickness of the solum is 0 to 10 inches. Depth to bedrock is more than 60 inches. Rock fragments range from 15 to 60 percent. Reaction is strongly acid to extremely acid, unless the soil is limed.

The A horizon has hue of 7.5YR, 10YR, 2.5Y, or 5Y, value of 3 to 6, and chroma of 1 to 6; or it is neutral with value of 3 to 6. The fine-earth texture is loam or silt loam.

The AC horizon has color and texture range similar to the A horizon.

The C horizon has hue of 7.5YR, 10YR, 2.5Y, or 5Y, value of 3 to 6, and chroma of 1 to 8; or it is neutral with value of 3 to 6. The fine-earth texture is loam, silt loam, clay loam, or silty clay loam.

Bonnie Series

The Bonnie series consists of very deep, poorly drained soils on flood plains. Permeability is moderately slow. These soils formed in silty alluvium. Slopes range from 0 to 2 percent. Bonnie soils are fine-silty, mixed, acid, mesic Typic Fluvaquents.

Bonnie soils are associated on the landscape with the Craigsville, Philo, Pope, Stendal, Stokly, and Yeager soils. Craigsville soils are well drained and are found on low stream terraces. Philo soils are moderately well drained and are found on low steam terraces. Pope soils are well drained and are found on low steam terraces. Stendal soils are somewhat poorly drained. Stokly soils are somewhat poorly drained. Yeager soils are well drained.

Typical pedon of Bonnie silt loam, occasionally flooded; on a 1 percent, concave slope in a field of fescue and timothy; 350 feet north 20 degrees west of the confluence of Sexton Creek and Ponder Branch, about 1.1 miles north of Burning Springs School, and 20 feet east of U.S. 421; Maulden quadrangle; Kentucky coordinates 2,559,500 feet east and 349,970 feet north.

Ap—0 to 9 inches; dark gray (2.5Y 4/1) silt loam; weak very fine granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

AC—9 to 13 inches; 60 percent light brownish gray (10YR 6/2) and 40 percent yellowish brown (10YR 5/6) silt loam; weak fine subangular blocky structure; friable; very few very fine roots; strongly acid; gradual smooth boundary.

Cg1—13 to 25 inches; gray (5Y 5/1) silt loam; massive; friable; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation in the matrix; strongly acid; gradual smooth boundary.

Cg2—25 to 40 inches; gray (5Y 5/1) silt loam; massive; friable; strongly acid; gradual smooth boundary.

Cg3—40 to 48 inches; gray (5Y 5/1) silt loam; massive; strongly acid; gradual smooth boundary.

Cg4—48 to 56 inches; gray (5Y 5/1) silt loam; massive; firm; many medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; strongly acid; gradual smooth boundary.

Cg5—56 to 60 inches; gray (5Y 5/1) silt loam; massive; firm; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; strongly acid; gradual smooth boundary.

Cg6—60 to 67 inches; gray (5Y 5/1) silt loam; massive; firm; many medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; many coarse black (10YR 2/1) iron and manganese concretions; 5 percent coarse gravel; strongly acid; gradual smooth boundary.

Cg7—67 to 80 inches; light gray (10YR 6/2) silt loam; massive; firm; many medium distinct yellowish brown (10YR 5/8) masses of iron accumulation in the matrix; few medium black (10YR 2/1) iron and manganese concretions; 3 percent medium gravel; strongly acid.

Thickness of the solum is 6 to 10 inches or more. Depth to bedrock is more than 60 inches. Rock fragments are usually absent throughout. To a depth of 40 inches, the reaction is strongly acid or very strongly acid, unless the soil is limed. Below a depth of 40 inches the reaction is neutral to very strongly acid.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 3. Fine-earth texture is silt loam.

The Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 or 6, and chroma of 1 or 2; or it is neutral with value of 5 or 6.

Redoximorphic features are in shades of gray, brown, or red. Fine-earth texture is silt loam.

Cloverlick Series

The Cloverlick series consists of very deep, well drained soils on side slopes, footslopes, and coves. Permeability is moderately rapid. These soils formed in stony, loamy colluvium derived from sandstone, siltstone, and shale. Slopes range from 35 to 75 percent. Cloverlick soils are loamy-skeletal, mixed, mesic Umbric Dystrochrepts.

Cloverlick soils are associated on the landscape with Highsplint, Kimper, and Shelocta soils. Highsplint soils lack a dark surface layer. Kimper soils are fine-loamy. Shelocta soils lack a dark surface layer and are fine-loamy.

Typical pedon of Cloverlick channery loam in an area of Shelocta-Cloverlick-Kimper complex, 35 to 75 percent slopes, very stony; on a 50 percent northeast-facing slope in a forest of yellow-poplar; 1,500 feet west-southwest of the second switchback, traveling from Goose Creek, on Forest Road 1738 (Suttons Branch Road), about 1.6 miles from Tanksley; Barcreek quadrangle; Kentucky coordinates 2,602,100 feet east and 322,800 feet north:

Oi—2 inches to 0; partially decomposed leaves, roots, and twigs; abrupt smooth boundary.

A—0 to 6 inches; 50 percent very dark grayish brown (10YR 3/2) and 50 percent dark brown (10YR 3/3) channery loam, brown (10YR 5/3) dry; weak fine granular structure; very friable; many fine roots; 15 percent channers; moderately acid; clear smooth boundary.

Bw1—6 to 13 inches; brown (10YR 4/3) very channery loam; weak fine granular structure;

friable; common medium roots; 55 percent channers; moderately acid; gradual wavy boundary.

Bw2—13 to 26 inches; yellowish brown (10YR 5/4) extremely channery loam; weak medium subangular blocky structure; friable; few fine roots; 65 percent channers; strongly acid; gradual wavy boundary.

Bw3—26 to 39 inches; yellowish brown (10YR 5/4) extremely channery loam; weak medium subangular blocky structure; friable; few fine roots; 70 percent channers; strongly acid; clear smooth boundary.

Bw4—39 to 45 inches; yellowish brown (10YR 5/4) extremely channery loam; weak medium subangular blocky structure; friable; 75 percent channers; very strongly acid; clear smooth boundary.

BC—45 to 63 inches; yellowish brown (10YR 5/4) extremely channery loam; weak fine subangular blocky structure; friable; 70 percent channers; very strongly acid; gradual smooth boundary.

CB—63 to 85 inches; yellowish brown (10YR 5/4) extremely channery loam; weak very fine subangular blocky structure; friable; 85 percent channers and flagstones; many silt flows across flagstone surfaces; very strongly acid.

Thickness of the solum is 40 to 65 inches or more. Depth to bedrock is more than 60 inches. Rock fragments range from 15 to 50 percent in the A horizon, 15 to 70 percent in the Bw horizons and 35 to 90 percent in the BC and C horizons. Reaction is extremely acid to strongly acid. Some A and upper Bw horizons are moderately acid or slightly acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The fine-earth texture is loam.

Some pedons have an AB horizon with a hue of 10YR, value of 3 or 4, and chroma of 2 to 4. The fine-earth texture is loam or silt loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth texture is loam or silt loam.

The BC, CB, and C horizons where present, have a hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. Some pedons are mottled in shades of brown, olive, or gray. The fine-earth texture is sandy loam, loam, silt loam, clay loam, or silty clay loam.

Cotaco Series

The Cotaco series consists of very deep, moderately well drained soils on stream terraces and alluvial fans. Permeability is moderate. These soils formed in loamy alluvium. Slopes range from 0 to 2 percent. Cotaco soils are fine-loamy, mixed, mesic Aquic Hapludults.

Cotaco soils are associated on the landscapes with the Allegheny, Barbourville, and Shelocta soils. Allegheny soils are well drained. Barbourville soils are well drained, have an umbric epipedon and are found on footslopes. Shelocta soils are well drained, lack water worn pebbles, and are found on side slopes and footslopes.

Typical pedon of Cotaco loam, rarely flooded; on a 1 percent slightly undulating slope in a field of corn; 3,300 feet southeast of the confluence of Beech Creek and Goose Creek, about 0.8 mile east-southeast of Tanksley; Barcreek quadrangle; Kentucky coordinates 2,593,700 feet east and 323,800 feet north:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam; weak medium granular structure; friable; common fine roots; trace of gravel; slightly acid; abrupt smooth boundary.

AB—7 to 17 inches; dark grayish brown (10YR 4/2) loam; weak medium subangular blocky structure parting to moderate medium granular; friable; common fine roots; trace of gravel; slightly acid; clear smooth boundary.

Bt1—17 to 25 inches; brown (10YR 5/3) loam; weak medium subangular blocky structure; friable; few fine roots; common organic coats on faces of peds; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation; trace of gravel; slightly acid; clear wavy boundary.

Bt2—25 to 38 inches; light olive brown (2.5Y 5/4) clay loam; moderate coarse subangular blocky structure parting to weak medium subangular blocky; firm; very few fine roots; common distinct clay films on faces of peds; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation and grayish brown (10YR 5/2) iron depletions; trace of gravel; strongly acid; gradual wavy boundary.

Bt3—38 to 50 inches; light olive brown (2.5Y 5/3) clay loam; weak medium subangular blocky structure; firm; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation; common prominent black (10YR 2/1) manganese stains throughout; strongly acid; gradual wavy boundary.

BC—50 to 60 inches; light olive brown (2.5Y 5/3) clay loam; weak medium subangular blocky structure; firm; many coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation; many prominent black (10YR 2/1) manganese stains

throughout; strongly acid; gradual smooth boundary.

C1—60 to 67 inches; light olive brown (2.5Y 5/3) sandy clay loam; massive; firm; strongly acid; gradual smooth boundary.

C2—67 to 75 inches; yellowish brown (10YR 5/8) sandy clay loam; massive; firm; few prominent black (10YR 2/1) manganese stains; 2 percent gravel; strongly acid; gradual smooth boundary.

C3—75 to 80 inches; yellowish brown (10YR 5/8) sandy clay loam; massive; firm; 5 percent gravel; strongly acid.

Thickness of the solum is 30 to 60 inches. Depth to bedrock is 60 inches or more. Rock fragments range from 2 to 35 percent in the solum and 2 to 50 percent in the C horizon. Reaction is strongly to extremely acid, unless the soil is limed.

The A or Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Fine-earth texture is loam.

Some pedons have an AB horizon with colors and fine-earth textures similar to the A or Ap horizon.

The Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 3 to 8. Redoximorphic features are in shades of brown, gray, and red. The fine-earth texture is loam, silt loam, or clay loam.

The BC horizon has color and fine-earth texture range similar to the Bt horizon.

The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 8, and chroma of 1 to 8. Redoximorphic features are in shades of brown, gray, and red. The fine-earth texture is loam, silt loam, clay loam, or sandy clay loam.

Cottonbend Series

The Cottonbend series consists of very deep, well drained soils on high stream terraces. Permeability is moderate. These soils formed in loamy, old alluvium, or colluvium. Slopes range from 2 to 6 percent. Cottonbend soils are fine-loamy, siliceous, mesic Typic Paleudults.

Cottonbend soils are associated on the same landscape with Allegheny, Cotaco, Lonewood, and Shelocta soils. Allegheny soils have mixed mineralogy. Cotaco soils are moderately well drained and have mixed mineralogy. Lonewood soils have solums 40 to 60 inches deep and are found on ridgetops and structural benches. Shelocta soils have mixed mineralogy and are found on side slopes and footslopes.

Typical pedon of Cottonbend loam, 2 to 6 percent slopes; on a 4 percent slope in a forested area; 800 feet south 20 degrees east of the confluence of Bowling Branch and Goose Creek, and 6,000 feet north 50 degrees east of Manchester School; Manchester quadrangle; Kentucky coordinates 2,581,700 feet east and 317,350 feet north:

Ap—0 to 8 inches; brown (10YR 4/3) loam; moderate fine granular structure; friable; many fine and medium and few coarse roots; strongly acid; clear wavy boundary.

Bt1—8 to 17 inches; yellowish brown (10YR 5/6) loam; weak medium and coarse subangular blocky structure; friable; few fine and medium roots; very few patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—17 to 26 inches; 50 percent yellowish brown (10YR 5/6) and 50 percent brownish yellow (10YR 6/6) clay loam; moderate medium subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt3—26 to 52 inches; 50 percent light yellowish brown (10YR 6/4) and 50 percent yellowish brown (10YR 5/4) clay; moderate coarse subangular blocky structure; firm; common distinct clay films on faces of peds; common coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation; strongly acid; gradual smooth boundary.

Bt4—52 to 70 inches; 50 percent yellowish brown (10YR 5/6) and 50 percent red (2.5YR 4/8) clay loam; moderate coarse subangular blocky and angular blocky structure; firm; common distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

CB—70 to 90 inches; 50 percent yellowish red (5YR 5/8) and 50 percent reddish yellow (7.5YR 6/8) sandy clay loam; massive; firm strongly acid.

Thickness of the solum is more than 60 inches. Depth to rock is greater than 72 inches. Rock fragments range from 0 to 5 percent in the Bt horizon above a depth of 40 inches, and from 0 to 40 percent below a depth of 40 inches in the Bt and the C or CB horizons. Reaction is slightly acid to strongly acid, unless the soil is limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Texture is loam.

Some pedons have an E horizon with hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. Fine-earth texture is sandy loam, fine sandy loam, or loam.

The Bt horizon, above a depth of 40 inches, has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. Mottles are in shades of brown or red. Fine-earth texture is dominantly sandy clay loam, loam, or clay loam.

The Bt horizon, below a depth of 40 inches, has a hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. Mottles are in shades of brown, gray, or red. The fine-earth texture is loam, clay loam, sandy clay loam, or clay.

The C, BC, and/or CB horizons have hues of 2.5YR to 10YR, values of 4 or 5, and chromas of 4 to 8. Fine earth-texture is the same as the Bt below 40 inches.

Craigsville Series

The Craigsville series consists of very deep, well drained soils on flood plains and low stream terraces. Permeability is moderately rapid to rapid. These soils formed in stony, loamy alluvium. Slopes range from 0 to 3 percent. Craigsville soils are loamy-skeletal, mixed, mesic Fluventic Dystrochrepts.

Craigsville soils are associated on same landscape with the Bonnie, Philo, Pope, Stendal, Stokly, and Yeager soils. Pope soils are coarse-loamy and Yeager soils are sandy. Philo soils are moderately well drained. Stendal and Stokly soils are somewhat poorly drained. Bonnie soils are poorly drained.

Typical pedon of Craigsville sandy loam in an area of Craigsville-Philo complex, 0 to 3 percent slopes, rarely flooded; on a gently undulating 2 percent slope in a field of corn; 400 feet southwest of the confluence of the South Fork of Whites Branch and Whites Branch, about 1.5 miles west of Cottongin, KY.; Hima quadrangle; Kentucky coordinates 2,560,500 feet east and 270,600 feet north:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; friable; many fine roots; 10 percent gravel; moderately acid; clear wavy boundary.

Bw—8 to 26 inches; yellowish brown (10YR 5/4) gravelly sandy loam; weak fine subangular blocky structure; friable; common fine roots; 15 percent gravel; strongly acid; clear wavy boundary.

2C1—26 to 40 inches; yellowish brown (10YR 5/4) extremely gravelly loamy sand; single grain; friable; 70 percent gravel; strongly acid; gradual irregular boundary.

2C2—40 to 65 inches; yellowish brown (10YR 5/4) extremely gravelly sandy loam with many thin strata of light gray (10YR 7/1) sandy clay loam; single grain; friable; 70 percent gravel; strongly acid; clear smooth boundary.

3Cg—65 to 80 inches; 50 percent light olive gray (5Y 6/2) and 50 percent yellowish brown (10YR 5/6) gravelly sandy loam; massive; friable; 25 percent gravel; many manganese concretions; strongly acid.

Thickness of the solum is 20 to 40 inches. Depth to bedrock is 60 inches or more. Rock fragments range from 5 to 60 percent in the A horizon and 35 to 70 percent in the B and C horizons. Reaction is strongly acid or very strongly acid, unless the soil is limed.

The A or Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. The fine-earth texture is fine sandy loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The fine-earth texture is sandy loam or fine sandy loam.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. Some have Cg horizons with hue of 5Y, value of 4 to 6, and chroma of 2 to 6. The fine-earth texture is sandy loam, loamy sand, loamy fine sand, or sand.

Fairpoint Series

The Fairpoint series consists of very deep, well drained soils on ridgetops, structural benches, side slopes, hollow fills, and stream terraces. Permeability is moderately slow. These soils formed in stony, loamy nonacid regolith from surface mining of coal or other highly disturbed areas. Slopes range from 2 to 70 percent. Fairpoint soils are loamy-skeletal, mixed, nonacid, mesic Typic Udorthents.

Fairpoint soils are associated on the landscape with Bethesda soils. Bethesda soils are acid.

Typical pedon of Fairpoint channery silty clay loam in an area of Fairpoint and Bethesda soils, 2 to 20 percent slopes; on a 10 percent smooth slope in a meadow of tall fescue, serica lespedeza, broomsedge, bluestem, and Virginia pine; 1,500 feet southwest of the intersection of U.S. Highway 421 and Fox Hollow Road, about 1.8 miles northwest of Manchester; Manchester quadrangle; Kentucky coordinates 2,575,300 feet east and 313,400 feet north:

A—0 to 11 inches; yellowish brown (10YR 4/6) channery silty clay loam; moderate medium granular structure; friable; many fine roots; 25 percent channers; moderately alkaline; abrupt irregular boundary.

C1—11 to 25 inches; 50 percent dark yellowish brown (10YR 4/4) and 50 percent brownish yellow (10YR 6/6) very channery silty clay loam; massive; friable; common fine roots; 55 percent channers and flagstones; slightly acid; clear wavy boundary.

C2—25 to 41 inches; brownish yellow (10YR 6/8) very channery silty clay loam; massive; firm; few fine roots; 30 percent channers; moderately acid; clear wavy boundary.
C3—41 to 55 inches; yellowish brown (10YR 5/6) extremely channery silty clay loam; massive; firm; 70 percent channers; moderately acid; clear smooth boundary.
C4—55 to 80 inches; yellowish brown (10YR 5/8) extremely channery silty clay loam; massive; firm; 70 percent channers and flagstones; moderately acid.

Solum thickness ranges from 0 to 11 inches. Depth to bedrock is 60 inches or more. Rock fragments range from 15 to 60 percent in the A horizon and from 35 to 60 percent in the C horizons. Reaction is neutral to moderately acid, except for some surface horizons that are moderately or slightly alkaline.

The A or Ap horizon has hue of 7.5YR, 10YR, 2.5Y, or 5Y, value of 3 to 6, and chroma of 0 to 6; or it is neutral with value of 3 to 6. The fine-earth texture is loam, silt loam, or silty clay loam.

The AC horizon has color and fine-earth texture range similar to the A horizon.

The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 4 to 8. The fine-earth texture is loam, silt loam, clay loam, or silty clay loam.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils on ridgetops and side slopes. Permeability is moderate. These soils formed in loamy residuum weathered from sandstone, siltstone, and shale. Slopes range from 3 to 100 percent. Gilpin soils are fine-loamy, mixed, mesic Typic Hapludults.

Gilpin soils are associated on the landscape with the Highsplint, Lonewood, Sequoia, and Shelocta soils. Highsplint soils are deep and very deep and are loamy-skeletal, Lonewood soils are deep and very deep and are siliceous, Sequoia soils are clayey and Shelocta soils are deep.

Typical pedon of Gilpin loam in an area of Gilpin-Shelocta-Sequoia complex, 25 to 55 percent slopes, very stony; on a convex 18 percent northeast-facing slope, in a forest of scarlet oak, red maple, and Virginia pine; 300 feet northeast of the intersection of Forest Roads 1640 and 1604 in the headwaters of Grannys Branch, about 2.5 miles north of Big Creek; Big Creek quadrangle; Kentucky coordinates 2,637,300 feet east and 321,000 feet north:

Oi—2 inches to 0; partially decomposed leaves, roots, and twigs; abrupt smooth boundary.
A—0 to 2 inches; brown (10YR 5/3) loam; weak fine granular structure; friable; many fine roots; 2 percent channers; strongly acid; clear smooth boundary.
BA—2 to 6 inches; light yellowish brown (2.5Y 6/4) loam; weak medium subangular blocky structure; friable; common fine roots; 5 percent channers; strongly acid; gradual smooth boundary.
Bt1—6 to 11 inches; brownish yellow (10YR 6/6) loam; moderate medium subangular blocky structure; firm; common fine roots; few faint clay films on faces of peds; 5 percent channers; very strongly acid; clear smooth boundary.
Bt2—11 to 18 inches; brownish yellow (10YR 6/8) channery silt loam; moderate medium subangular blocky structure; firm; common medium roots; common faint clay films on faces of peds; 15 percent channers; very strongly acid; gradual smooth boundary.
Bt3—18 to 26 inches; brownish yellow (10YR 6/8) channery silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common faint clay films on faces of peds; 20 percent channers; very strongly acid; gradual smooth boundary.
BC—26 to 30 inches; strong brown (7.5YR 5/8) channery loam; weak medium subangular blocky structure; firm; few fine roots; 25 percent channers; very strongly acid, clear smooth boundary.
Cr—30 to 36 inches; weathered sandstone; abrupt smooth boundary.
R—36 inches; interbedded sandstone and siltstone bedrock.

Thickness of the solum is 18 to 40 inches. Depth to bedrock is 20 to 40 inches. Rock fragments range from 5 to 35 percent in the solum and from 30 to 90 percent in the C horizons. Reaction is strongly acid to extremely acid, unless the soil is limed.

The A or Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. Fine-earth texture is loam.

The BA horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 3 to 5. Fine-earth texture is loam or silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. The fine-earth texture is loam, silt loam, or silty clay loam.

The BC horizon has color and fine-earth texture range similar to the Bt horizon.

Some pedons have a C horizon with hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 3 to 6. The fine-earth texture is loam, silt loam, or silty clay loam.

Highsplint Series

The Highsplint series consists of very deep, well drained soils on side slopes and footslopes. Permeability is moderate or moderately rapid. These soils formed in stony, loamy colluvium.

Slopes range from 35 to 100 percent. Highsplint soils are loamy-skeletal, mixed, mesic Typic Dystrochrepts.

Highsplint soils are associated on the same landscape with the Cloverlick, Gilpin, Kimper, and Shelocta soils. Cloverlick soils have a dark colored surface layer. Gilpin soils are fine-loamy and moderately deep. Kimper soils are fine-loamy and have a dark colored surface layer. Shelocta soils are fine-loamy and deep.

Typical pedon of Highsplint channery loam in an area of Shelocta-Highsplint complex, 35 to 75 percent slopes, very stony; on a 50 percent southeast-facing slope in a forest of American beech, white oak, and chestnut oak; near Dry Branch and 2,500 feet northeast of the intersection of Kentucky Highway 1524 and Otter Creek Road, about 2.7 miles north-northwest of Brightshade; Ogle quadrangle; Kentucky coordinates 2,607,200 feet east and 270,800 feet north:

Oi—2 inches to 0; partially decomposed leaves, roots, and twigs; abrupt smooth boundary.

A—0 to 2 inches; yellowish brown (10YR 5/4) channery loam; weak fine granular structure; very friable; many fine roots; 15 percent channers; very strongly acid; clear smooth boundary.

Bw1—2 to 8 inches; yellowish brown (10YR 5/6) channery loam; weak fine subangular blocky structure; friable; common fine roots; 15 percent channers; very strongly acid; clear smooth boundary.

Bw2—8 to 28 inches; yellowish brown (10YR 5/6) very flaggy loam; moderate medium subangular blocky structure; friable; few fine roots; 40 percent flagstones; very strongly acid; gradual smooth boundary.

Bw3—28 to 51 inches; yellowish brown (10YR 5/6) very flaggy loam; common medium distinct (7.5YR 5/4) mottles; moderate medium subangular blocky structure; firm; 55 percent flagstones; very strongly acid; clear smooth boundary.

C—51 to 80 inches; yellowish brown (10YR 5/4) extremely flaggy loam; common medium distinct (7.5YR 5/4) and few medium prominent light olive gray (5Y 6/2) mottles; massive; firm; 70 percent flagstones; very strongly acid.

Thickness of the solum is 40 to 60 inches or more. Depth to bedrock is 60 inches or more. Rock fragments range from 15 to 35 percent in the A horizon and from 35 to 90 percent in the Bw and C horizons. Reaction is strongly acid or very strongly acid. Some A horizons are slightly acid or moderately acid.

The A horizon has hue of 10YR, value of 4 or 5 and chroma of 2 to 4. The fine-earth texture is loam or silt loam.

Some pedons have a BA horizon with hue of 7.5YR or 10YR, value of 4 or 5 and chroma of 3 to 6. Fine-earth texture is loam, silt loam, or silty clay loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. Mottles are in shades of brown, olive, or gray below a depth of 24 inches. The fine-earth texture is loam, silt loam, clay loam, or silty clay loam.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. Mottles are in shades of brown, gray, or olive. The fine-earth texture is sandy loam, fine sandy loam, loam, silt loam, clay loam, or silty clay loam.

Kimper Series

The Kimper series consists of very deep, well drained soils on side slopes, footslopes, and coves. Permeability is moderate. These soils formed in loamy colluvium from sandstone, siltstone, and shale.

Slopes range from 35 to 75 percent. Kimper soils are fine-loamy, mixed, mesic Umbric Dystrochrepts.

Kimper soils are associated on the landscape with the Cloverlick, Highsplint, and Shelocta soils. Cloverlick soils are loamy-skeletal. Highsplint soils are loamy-skeletal and lack a dark colored surface layer. Shelocta soils have an argillic layer and are deep.

Typical pedon of Kimper loam in an area of Shelocta-Cloverlick-Kimper complex, 35 to 75 percent slopes, very stony; on a 50 percent concave northeast-facing slope in an old field of grasses, tall weeds, and yellow-poplar; 900 feet south of the intersections of Collins Fork Road and Crane Creek Road, about 0.5 mile north of Laurel Creek; Maulden quadrangle; Kentucky coordinates 2,581,500 feet east and 340,300 feet north:

A—0 to 7 inches; dark brown (10YR 3/3), brown (10YR 5/3) dry, channery loam; weak fine granular structure; friable; common medium roots; 15 percent channers; strongly acid; clear smooth boundary.

AB—7 to 19 inches; brown (10YR 4/3) channery loam; moderate fine granular structure; friable; many fine roots; 15 percent channers; strongly acid; clear smooth boundary.
Bw1—19 to 32 inches; yellowish brown (10YR 5/4) channery loam; moderate fine subangular blocky structure; friable; 30 percent channers; very strongly acid; clear wavy boundary.
Bw2—32 to 50 inches; yellowish brown (10YR 5/6) channery loam; moderate medium subangular blocky structure; friable; very few fine roots; 30 percent channers; very strongly acid; gradual wavy boundary.
Bw3—50 to 60 inches; yellowish brown (10YR 5/6) channery clay loam; moderate medium subangular blocky structure; firm; 30 percent channers; very strongly acid.
C—60 to 80 inches; yellowish brown (10YR 5/6) channery clay loam; few coarse faint pale brown (10YR 6/3) mottles; massive; firm; very strongly acid.

Thickness of the solum is 40 to 60 inches. Depth to bedrock is 60 inches or more. Rock fragments range from 5 to 35 percent in the solum. Reaction is moderately acid to very strongly acid. Some A horizons are neutral to extremely acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 4. The fine-earth texture is loam or silt loam and their channery equivalents.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth texture is loam, silt loam, clay loam, or silty clay loam and their channery equivalents.

Some pedons have a C horizon with hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 8. The fine-earth texture is sandy loam, loam, silt loam, or silty clay loam.

Lonewood Series

The Lonewood series consists of deep, well drained soils on low ridgetops and structural benches. Permeability is moderate. These soils formed in loamy residuum from sandstone, siltstone, and shale. Slopes range from 2 to 12 percent. Lonewood soils are fine-loamy, siliceous, mesic Typic Hapludults.

Lonewood soils are associated on the landscape with Gilpin, Sequoia, and Shelocta soils. Gilpin soils have mixed mineralogy and are moderately deep. Sequoia soils are clayey and are moderately deep. Shelocta soils have mixed mineralogy.

Typical pedon of Lonewood loam, 6 to 12 percent slopes, eroded; on a 9 percent convex slope in a tobacco field; 300 feet east of a cemetery and 600 feet northeast of where Kentucky Highway 3432 crosses Hart Branch, about 1.2 miles northeast of Manchester; Barcreek quadrangle; Kentucky coordinates 2,583,300 feet east and 309,600 feet north:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) loam; weak medium granular structure; friable; common fine roots; common fine pores; neutral; abrupt smooth boundary.
Bt1—8 to 18 inches; yellowish brown (10YR 5/6) clay loam; moderate fine subangular blocky structure; firm; common fine roots; common fine pores; few faint clay films on faces of peds; neutral; clear wavy boundary.
Bt2—18 to 27 inches; yellowish brown (10YR 5/6) clay loam; moderate fine subangular blocky structure; firm; few fine roots; common fine pores; common distinct clay films on faces of peds; slightly acid; clear smooth boundary.
Bt3—27 to 44 inches; brownish yellow (10YR 6/6) clay loam; moderate fine subangular blocky structure; firm; very few fine roots; few fine pores; common distinct clay films on faces of peds; moderately acid; clear smooth boundary.
2C—44 to 50 inches; brown (10YR 5/3) clay; massive; firm; common medium distinct light gray (10YR 6/1) iron depletions; very few fine roots; strongly acid; clear smooth boundary.
Cr—50 to 54 inches; weathered shale.

Thickness of the solum is 40 to 60 inches. Depth to bedrock is 40 to 60 inches. Rock fragments range from 0 to 5 percent in the A and upper Bt horizons, 0 to 10 percent in the lower Bt horizons, and from 10 to 70 percent in the C horizons. Reaction is neutral to very strongly acid, unless the soil is limed.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4. Fine-earth texture is loam.

The Bt horizon has hue of 10YR, 7.5YR, 5YR, value of 4 or 5, and chroma of 6 or 8. Mottles are in shades of brown, red, and yellow. Fine-earth texture is loam or clay loam.

Some pedons have a BC horizon that has hue of 5YR or 10YR, value of 4 or 5, and chroma of 6 or 8. Mottles are in shades of gray, red, and yellow. Fine-earth texture is sandy loam, loam, or clay loam.

The 2C horizon has color ranges similar to the BC horizon. Fine-earth texture is clay loam, silty clay, or

clay. In addition, mottles range to shades of gray in some pedons.

Philo Series

The Philo series consists of very deep, moderately well drained soils on flood plains and low stream terraces. Permeability is moderate. These soils formed in loamy alluvium. Slopes range from 0 to 3 percent. Philo soils are coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts.

Philo soils are associated on the landscape with the Bonnie, Craigsville, Pope, Stendal, Stokly, and Yeager soils. Craigsville, Pope, and Yeager soils are well drained. Stendal and Stokly soils are somewhat poorly drained. Bonnie soils are poorly drained.

Typical pedon of Philo fine sandy loam, rarely flooded; on a 1 percent smooth slope in a pasture of tall fescue and clover; 600 feet southwest of the confluence of Spencers Branch and Big Creek, about 0.3 mile east of Big Creek; Big Creek quadrangle; Kentucky coordinates 2,636,500 feet east and 308,900 feet north:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; trace of gravel; moderately acid; abrupt smooth boundary.

Bw1—7 to 17 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine subangular blocky structure; friable; few distinct brown (10YR 4/3) organic coats in root channels and pores; trace of gravel; moderately acid; clear smooth boundary.

Bw2—17 to 26 inches; yellowish brown (10YR 5/6) fine sandy loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; common black iron-manganese stains throughout; trace of gravel; very strongly acid; gradual smooth boundary.

BC—26 to 44 inches; light brownish gray (10YR 6/2) sandy loam; weak medium subangular blocky structure; friable; common coarse distinct strong brown (7.5YR 5/6) masses of iron accumulation; trace of gravel; slightly acid; gradual smooth boundary.

Cg—44 to 80 inches; yellowish brown (10YR 6/8) and light brownish gray (10 YR 6/2) sandy loam; massive; friable; few fine faint strong brown (7.5YR 5/6) masses of iron accumulation; trace of gravel; neutral.

Thickness of the solum is 20 to 48 inches or more. Depth to bedrock is 60 inches or more. Rock fragments range from 0 to 20 percent in the A, Bw, and C horizons; and in the 2C horizons, below 40 inches range from 0 to 75 percent. Reaction is moderately acid to very strongly acid, unless the soil is limed and slightly acid to very strongly acid in the BC and C horizons.

The A or Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The fine-earth texture is fine sandy loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. Mottles are in shades of brown or gray. The fine-earth texture is sandy loam, fine sandy loam, loam, or silt loam.

The Cg horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 1 to 8; or it is neutral with value of 4 to 6. Mottles are in shades of brown, gray, or red. Fine-earth texture is sandy loam, fine sandy loam, loam, or silt loam.

Some pedons have a C horizon with hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 3 to 6. Mottles are in shades of brown, gray, or red. Fine-earth texture is sandy loam, fine sandy loam, loam, or silt loam.

The 2C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 1 to 6; or it is neutral with value of 4 to 6. Mottles are in shades of brown, gray, or red. The fine-earth texture is sand, loamy fine sand, sandy loam, fine sandy loam, loam, or silt loam.

Pope Series

The Pope series consists of very deep, well drained soils on flood plains and low stream terraces. Permeability is moderate or moderately rapid. These soils formed in loamy alluvium. Slopes range from 0 to 2 percent. Pope soils are coarse-loamy, mixed, mesic Fluventic Dystrochrepts.

Pope soils are associated on the landscape with the Bonnie, Craigsville, Philo, Stendal, Stokly, and Yeager soils. Bonnie soils are poorly drained. Craigsville soils are loamy-skeletal. Philo soils are moderately well drained. Stendal and Stokly soils are somewhat poorly drained. Yeager soils are sandy.

Typical pedon of Pope loam, occasionally flooded; on a 1 percent slightly undulating slope in a field of tall weeds; 400 feet west of the confluence of Lower Rich Branch and the Red Bird River, about 1.5 miles south of Spring Creek; Creekville quadrangle; Kentucky coordinates 2,642,400 feet east and 265,500 feet north:

A—0 to 11 inches; brown (10YR 4/3) loam; weak very fine subangular blocky structure; friable; many fine roots; trace of gravel; moderately acid; clear smooth boundary.

Bw1—11 to 24 inches; brown (10YR 4/3) loam; weak fine subangular blocky structure; friable; common fine roots; 1 percent gravel; strongly acid; clear smooth boundary.

Bw2—24 to 48 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; few fine roots; common faint organic coats on faces of peds and in pores; trace of gravel; strongly acid; clear smooth boundary.

C—48 to 67 inches; dark yellowish brown (10YR 4/4) fine sandy loam; massive; friable; trace of gravel; strongly acid; gradual smooth boundary.

R—67 inches: hard sandstone bedrock.

Thickness of the solum is 30 to 50 inches or more. Depth to bedrock is 60 inches or more. Rock fragments range from 0 to 30 percent to a depth of 40 inches and from 0 to 75 percent below 40 inches. Reaction is strongly acid to extremely acid, unless the soil is limed.

The A or Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The fine-earth texture is fine sandy loam or loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. Fine-earth texture is sandy loam, fine sandy loam, loam, or silt loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. Mottles are in shades of gray in some pedons. The fine-earth texture is loamy sand, loamy fine sand, sandy loam, or fine sandy loam.

Sequoia Series

The Sequoia series consists of moderately deep, well drained soils on ridgetops. Permeability is moderately slow. These soils formed in clayey residuum from siltstone and shale. Slopes range from 25 to 55 percent. Sequoia soils are clayey, mixed, mesic Typic Hapludults.

Sequoia soils are associated on the landscape with the Gilpin and Shelocta soils. Gilpin soils are fine-loamy. Shelocta soils are fine-loamy and deep.

Typical pedon of Sequoia silt loam in an area of Gilpin-Shelocta-Sequoia complex, 25 to 55 percent slopes, very stony; on a 34 percent convex south-facing slope in a forest of scarlet oak and red maple; along a logging road about 2,100 feet southwest of the junction of Forest Service Roads 1640 and 1512 in the headwaters of an unnamed tributary of Ulysses Creek, about 3.8 miles northeast of Big Creek; Big Creek quadrangle; Kentucky coordinates 2,646,000 east and 325,300 north:

Oi—1 inch to 0; partially decomposed leaves, roots, and twigs; abrupt smooth boundary.

A—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine roots; 3 percent channers; very strongly acid; abrupt wavy boundary.

Bt1—2 to 9 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common faint clay films on faces of peds and in pores; 3 percent channers; very strongly acid; clear smooth boundary.

Bt2—9 to 23 inches; strong brown (7.5YR 5/6) silty clay; moderate medium subangular blocky structure; firm; common fine roots; common faint clay films on faces of peds and in pores; 3 percent channers; very strongly acid; clear smooth boundary.

R—23 inches; siltstone bedrock.

Thickness of the solum is 20 to 40 inches. Depth to bedrock is 20 to 40 inches. Rock fragments range from 0 to 10 percent in the A horizon and from 0 to 25 percent in the B and C horizons. Reaction is strongly acid or very strongly acid, unless the soil is limed.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Fine-earth texture is silt loam.

Some pedons have a BA horizon with hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 4 to 8. The fine-earth texture is silty clay loam, silty clay, or clay.

The Bt horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 6 to 8. Mottles are in shades of brown, red, or yellow. The fine-earth texture is silty clay loam, silty clay, or clay.

Some pedons have a BC horizon with hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 4 to 8. Mottles are in shades of gray, red, or yellow. The fine-earth texture is silty clay loam, silty clay, or clay.

Shelocta Series

The Shelocta series consists of deep, well drained soils on side slopes and footslopes. Permeability is moderate. These soils formed in loamy colluvium and residuum from sandstone, siltstone, and shale. Slopes range from 2 to 75 percent. Shelocta soils are fine-loamy, mixed, mesic Typic Hapludults.

Shelocta soils are associated on the landscape with Allegheny, Barbourville, Cloverlick, Cotaco, Gilpin, Highsplint, Kimper, and Sequoia soils. Allegheny soils are on stream terraces and alluvial

fans and contain water-worn pebbles. Barbourville soils have an umbric epipedon. Cotaco soils are moderately well drained and are on steam terraces and alluvial fans. Cloverlick and Highsplint soils are loamy-skeletal. Gilpin and Sequoia soils are moderately deep and are on ridgetops. Kimper soils have a dark colored surface layer and lack an argillic layer.

A typical pedon of Shelocta gravelly silt loam, in an area of Shelocta-Cloverlick-Kimper complex, 35 to 75 percent slopes, very stony; on a 58 percent plane northeast-facing slope in a switchback, traveling from Goose Creek, on Forest Service Road 1738 (Suttons Branch Road), about 1.7 miles from Tanksley; Barcreek quadrangle; Kentucky coordinates 2,602,600 feet east and 323,100 feet north:

Oi—1 inch to 0; partially decomposed leaves, roots, and twigs; abrupt smooth boundary.

A—0 to 3 inches; brown (10YR 4/3) gravelly silt loam; weak fine granular structure; friable; many fine roots; 15 percent gravel; moderately acid; clear smooth boundary.

BA—3 to 10 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium granular and weak fine subangular blocky structure; friable; many fine roots; 5 percent channers; strongly acid; clear smooth boundary.

Bt1—10 to 20 inches; yellowish brown (10YR 5/6) silty clay loam; moderate fine subangular blocky structure; friable; common fine roots; common distinct clay films on ped faces; 10 percent channers; strongly acid; clear smooth boundary.

Bt2—20 to 36 inches; yellowish brown (10YR 5/6) channery silty clay loam; coarse medium subangular blocky structure; friable; few fine roots; common distinct clay films on ped surfaces; 15 percent channers; strongly acid; clear smooth boundary.

BC—36 to 45 inches; yellowish brown (10YR 5/6) channery silty clay loam; moderate medium subangular blocky and weak coarse platy structure; firm; very few fine roots; 15 percent channers; strongly acid; clear smooth boundary.

Cr—45 to 55 inches; weathered gray shale fragments.

Thickness of the solum is 40 to 60 inches. Depth to bedrock is 40 to 60 inches. Rock fragments range from 15 to 35 percent in the A horizon, from 5 to 35 percent in the Bt horizons, and from 15 to 70 percent in the C horizon. Reaction is strongly acid to extremely acid, unless the soil is limed. Some pedons have an A horizon that is slightly acid or moderately acid.

The A or Ap horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 2 to 4. The fine-earth texture is loam or silt loam.

The Bt and BC horizons have hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 4 to 8. The fine-earth texture is loam, silt loam, or silty clay loam. Some pedons have a 2Bt horizon that formed from residuum. Color, texture, and rock fragment content are the same as the Bt horizon.

Some pedons have a C or 2C horizon with hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. Mottles are in shades of brown, gray, or olive. The fine-earth texture is loam, silt loam, or silty clay loam. Rock fragments range from 15 to 70 percent.

Bedrock is weathered shale.

Stendal Series

The Stendal series consists of very deep, somewhat poorly drained soils on flood plains. Permeability is moderate. These soils formed in loamy alluvium. Slopes range from 0 to 2 percent. Stendal soils are fine-silty, mixed, acid, mesic, Aeric Fluvaquents.

Stendal soils are associated on the landscape with Bonnie, Craigsville, Philo, Pope, Stokly, and Yeager soils. Craigsville soils are well drained and are loamy-skeletal. Philo soils are moderately well drained. Pope soils are well drained and are coarse-loamy. Stokly soils are coarse-loamy. Bonnie soils are poorly drained. Yeager soils are well drained and are sandy.

Typical pedon of Stendal silt loam, occasionally flooded; on a 1 percent slightly undulating slope in a field of tall weeds; 600 feet east of the intersection of U.S. Highway 421 and Kentucky Highway 149, about 1.6 miles east of Garrard; Ogle quadrangle; Kentucky coordinates 2,591,900 feet east and 291,200 feet north:

Ap—0 to 6 inches; dark brown (10YR 3/3) silt loam; moderate fine granular structure; very friable; common fine roots; strongly acid; clear smooth boundary.

AB—6 to 10 inches; dark grayish brown (10YR 4/2) silt loam; few fine faint grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; very friable; common fine roots; very strongly acid; abrupt smooth boundary.

Bw1—10 to 13 inches; brown (10YR 5/3) silt loam; weak fine subangular blocky structure; friable; many fine prominent dark brown (7.5YR 3/2) masses of iron and manganese accumulation; very strongly acid; clear smooth boundary.

Bg1—13 to 25 inches; grayish brown (2.5Y 5/2) silt

loam; weak fine subangular blocky structure; friable; many fine prominent dark brown (7.5YR 3/2) masses of iron and manganese accumulation; very strongly acid; diffuse boundary.

Cg1—25 to 35 inches; gray (5Y 5/1) silt loam; massive; friable; common fine prominent dark brown (7.5YR 4/4) masses of iron accumulation; very strongly acid; clear smooth boundary.

Cg2—35 to 62 inches; gray (10YR 5/1) silty clay loam; massive; many medium distinct strong brown (7.5YR 4/4) masses of iron accumulation; slightly sticky; very strongly acid.

R—62 inches; hard sandstone bedrock.

Depth to bedrock is 60 inches or more. Rock fragments are usually absent throughout. Reaction is strongly acid or very strongly acid, unless the soil is limed.

The Ap horizon has hue of 10YR, value of 3 or 5, and chroma of 2 to 4. Fine-earth texture is silt loam.

The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 to 6. Redoximorphic features are in shades of brown, gray, or olive. Fine-earth texture is silt loam or silty clay loam.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 to 6. Redoximorphic features are in shades of brown, gray, or olive. Fine-earth texture is silt loam or silty clay loam.

Stokly Series

The Stokly series consists of very deep, somewhat poorly drained soils on flood plains. Permeability is moderately rapid. These soils formed in loamy alluvium. Slopes range from 0 to 2 percent. Stokly soils are coarse-loamy, mixed, acid, mesic Aeric Fluvaquents.

Stokly soils are associated on the landscape with the Bonnie, Craigsville, Philo, Pope, Stendal, and Yeager soils. Bonnie soils are poorly drained and are fine-silty. Craigsville soils are well drained and are loamy-skeletal. Philo soils are moderately well drained. Pope soils are well drained. Stendal soils are fine-silty. Yeager soils are well drained and are sandy.

Typical pedon of Stokly silt loam, occasionally flooded; 1,760 feet south 42 degrees west from the confluence of Baker Creek and Martin Creek, about 1 mile southwest of Dripping Springs School on Dripping Springs Road; Portersburg quadrangle; Kentucky coordinates 2,529,250 east and 319,750 north:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/6) and light olive brown (2.5Y 5/3) fine sandy loam, weak fine granular structure; friable; many very fine and few medium roots; neutral; clear smooth boundary.

Bw1—8 to 15 inches; strong brown (7.5YR 4/6) and yellowish brown (10YR 5/8) loam; weak fine subangular blocky structure; friable; few very fine roots; few medium prominent light brownish gray (2.5Y 6/2) iron depletions; slightly acid; clear smooth boundary.

Bw2—15 to 21 inches; gray (2.5YR 6/2) sandy loam and strong brown (7.5YR 4/6) sandy loam; weak fine subangular blocky structure; friable; very few very fine roots; few medium prominent yellowish brown (10YR 5/6) iron accumulations; slightly acid; clear smooth boundary.

Bg1—21 to 31 inches; strong brown (7.5YR 5/8) and light olive gray (5Y 6/2) gravelly sandy loam; few medium distinct light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; few medium distinct light brownish gray (10YR 6/2) iron depletions; 15 percent gravel; slightly acid; abrupt smooth boundary.

Bg2—31 to 40 inches; gray (5Y 6/1) and brownish yellow (10YR 6/8) sandy loam; weak fine platy structure; friable; 7 percent gravel; strongly acid.

Cg—40 to 80 inches; olive gray (5Y 5/2) gravelly sandy loam; massive; very friable; many medium distinct brown (7.5YR 4/4) iron accumulations; 15 percent gravel; very strongly acid.

Thickness of the solum is 20 to 40 inches or more. Depth to bedrock is 60 inches or more. Rock fragments range from 0 to 15 percent in the solum and 0 to 40 percent in the C horizons. Reaction is neutral to extremely acid, unless the soil is limed.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 6. Fine-earth texture is fine sandy loam.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 or 6, and chroma of 2 to 6. Redoximorphic features are in shades of gray or brown. Fine-earth texture is fine sandy loam, sandy loam, or loam.

The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 to 8. Redoximorphic features are in shades of gray or brown. Fine-earth texture is fine sandy loam, sandy loam, or loam.

Some pedons have a Cg horizon with hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. Redoximorphic features are in shades of gray or brown. The fine-earth texture is fine sandy loam, sandy loam, or loam.

Udorthents

Udorthents consist of fill material composed mainly of soils and rock that have been altered from their natural state during construction activities involving roads, highways, streams, industrial areas, or areas around cities and towns. The characteristics of Udorthents vary in the extreme because the natural soils have been altered extensively; therefore, a typical pedon cannot be given.

Yeager Series

The Yeager series consists of very deep, well drained soils on flood plains. Permeability is moderately rapid or rapid. These soils formed in loamy and sandy alluvium. Slopes range from 0 to 2 percent. Yeager soils are sandy, mixed, mesic Typic Udifluvents.

Yeager soils are associated on the landscape with the Bonnie, Craigsville, Philo, Pope, Stendal, and Stokly soils. Bonnie soils are poorly drained. Craigsville soils are loamy-skeletal. Philo soils are moderately well drained. Pope soils are coarse-loamy. Stendal and Stokly soils are somewhat poorly drained.

Typical pedon of Yeager fine sandy loam, occasionally flooded; on a 1 percent smooth slope in a field of corn; 1,300 feet northwest of the intersection of Kentucky Highway 1524 and Mill Creek Road, about 0.25 mile northwest of Brightshade; Ogle quadrangle; Kentucky coordinates 2,609,900 feet east and 258,000 feet north:

Ap—0 to 9 inches; brown (10YR 4/3) fine sandy loam; weak coarse granular structure; very friable; common fine roots; common medium channers; 1 percent gravel; very strongly acid; clear wavy boundary.

AC—9 to 13 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky structure; very friable; few fine roots; few medium channers; 1 percent gravel; moderately acid; abrupt irregular boundary.

C1—13 to 24 inches; yellowish brown (10YR 5/4) sand; single grain; nonsticky; very few fine roots; 1 percent gravel; moderately acid; clear wavy boundary.

C2—24 to 49 inches; strata of brown (10YR 4/3) fine sandy loam and dark yellowish brown (10YR 4/4) loamy fine sand; single grain; very friable; 1 percent gravel; moderately acid; clear wavy boundary.

C3—49 to 80 inches; dark yellowish brown (10YR 4/4) sand; single grain; nonsticky; 3 percent gravel; moderately acid.

Depth to bedrock is 60 inches or more. Rock fragments range from 0 to 15 percent to a depth of 40 inches and 0 to 50 percent below a depth of 40 inches. Reaction is moderately acid to very strongly acid unless the soil is limed.

The Ap, A, or AC horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4. Fine-earth texture is fine sandy loam.

The C horizon, to a depth of 40 inches, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 8. Fine-earth texture is loamy sand or loamy fine sand or sand with thin strata of loamy material.

The C horizon, below a depth of 40 inches, has colors similar to the upper part. The fine-earth texture is sand, fine sand, loamy sand, or loamy fine sand with thin strata of loamy material. Rock fragments range from 0 to 35 percent.

Formation of the Soils

This section describes how the major factors of soil formation have altered the soils in Clay County and explains the processes of soil formation.

Factors of Soil Formation

Soil is a natural, three-dimensional body on the earth's surface that supports plants and has properties resulting from the interaction of climate and living matter on earthy parent material, as conditioned by relief over time.

The interaction of five main factors results in differences among soils. These factors are the physical and chemical composition of the parent material; the climate during and after the accumulation of the parent material; the kinds of plants and animals living in the soil; the relief or topography of the land and its effect on drainage; and the length of time the soil forming factors have been in progress. In the following paragraphs the factors of soil formation are discussed as they relate to the soils of Clay County.

Climate

Climate affects the physical, chemical, and biological relationships in soils. It influences the kind and number of plants and animals, the weathering and decomposition of rocks and minerals, the amount of soil erosion, and the rate of soil formation.

The climate of Clay County is humid and temperate. The average annual precipation is 45 inches and the mean air temperature is 12.2 degrees C. The soils are seldom completely dry and are frozen for short periods of time; therefore, they are subject to leaching and weathering throughout the year. The soluble bases have been largely leached out of the surface layer and upper part of the subsoil and clay minerals have moved from the surface layer into the subsoil. As a result, most of the soils have a leached, acid surface layer and a subsoil that is finer textured than the surface layer.

Plants and Animal Life

Plants affect soil formation mainly by adding organic matter. Animals, bacteria, and fungi contribute to soil formation by converting the remains of plants to organic matter and plant nutrients. The organic matter imparts a dark color to the soil material and the humus, or decomposed organic matter, aids in the formation of soil structure.

Most of the soils in Clay County formed under hardwood forest. Soils that formed under hardwood forest have less organic matter in the surface layer than those that formed under grass.

Man has greatly altered the surface layer and the soil environment by clearing the forest and plowing the soil. Man has mixed the soil layers, moved soil from place to place, added fertilizer and lime, and introduced new plants. In places, accelerated erosion has removed most of the original surface layer and exposed the less productive subsoil.

Parent Material

Parent material is the unconsolidated mass from which soils form. It is produced by the weathering or decomposition of rock and minerals. It influences the mineral and chemical composition of the soil and, to a large extent, the rate at which soil formation takes place. In Clay County the soils formed mainly in colluvial deposits on hillsides; in fluvial deposits along rivers and steams and in some high level fluvial deposits on certain rivers; and in material weathered from bedrock. Shelocta soils, for example, formed in colluvium from hillsides. Pope and Yeager soils formed in fluvial deposits on flood plains along rivers and steams, and Allegheny soils formed in fluvial deposits on steam terraces. Sequoia soils formed in material weathered from bedrock.

Relief

The relief influences soil formation primarily through its effect on drainage and erosion. Differences in

landscape position also influence variations in exposure to sun, wind, air, drainage, soil temperature, and plant cover.

Erosion removes the soil almost as rapidly as it forms in areas of steep soils and affects soil depth. As a result, the upper side slopes are moderately deep and the lower colluvial side slopes are deep and very deep. Also, in these steep side slope areas, only a small amount of water enters the soil; the rest is lost to runoff.

In areas of gently sloping soils, enough water moves downward to cause leaching and a pronounced accumulation of clay in the subsoil. These soils are generally deep and have well defined layers or profiles. In some places the soils show some evidence of wetness, such as mottling, in the subsoil.

Time

A long period of time is required for distinct soil profiles to develop. The length of time required depends mainly on the kind and nature of the parent material and the relief.

Soils that formed in recent sediment, such as those on flood plains have weak horizon development. The surface layer of these soils may show an increase in the organic matter content and the subsoil may show some development such as weak structure. Some examples of these soils in Clay County are Bonnie, Pope, and Philo.

A soil is generally said to be mature when it has been in place and subject to the influence of plant and animal life, climate, and topography long enough to acquire distinct profile characteristics. These soils generally have well developed subsoil horizons that have significant accumulation of illuvial clay. Allegheny, Gilpin, and Shelocta are examples of mature soils with well developed subsoil horizons.

Processes of Soil Formation

The formation of a succession of layers, or horizons, in soil is the result of one or more of the following processes: accumulation of organic matter; leaching of carbonates and other soluble minerals; chemical weathering of primary minerals into silicate clay minerals; translocation of the silicate clays and some silt-sized particles from one horizon to another; and reduction and transfer of iron. Several of these processes have been active in the formation of the soils in Clay County.

Some organic matter has accumulated in all the soils of Clay County to form the surface layers such as the O and A horizons. Organic matter accumulates as plant residue, and applied organic matter decompose and are incorporated into the soil. This accumulation is readily observed in the Barbourville, Kimper, and Cloverlick series. Most of the soils contain moderate amounts of organic matter in the surface layer. If tilled, the A horizon will become part of the Ap horizon.

Most of the soils in Clay County are acid throughout the profile. The carbonates and other soluble materials have been partially leached into the lower layers or out of the soil profile.

The translocation of clay minerals is an important process in the horizon development of many soils in Clay County. Allegheny, Shelocta, Cotaco, and Lonewood series show pronounced clay movement. As clay minerals are removed from the A horizon, they accumulate as clay films on peds faces, in pores, and in root channels and form the B horizon.

The reduction with water and transfer of iron has occurred in soils that are saturated for long periods of time. This process is known as gleying. Gleyed soils are identified by gray color and commonly with brownish mottles. Evidence of this process can be seen in the Bonnie, Stendal, Cotaco, and Philo series. Part of the iron may be reoxidized and segregated, forming the yellowish brown, strong brown, and other brightly colored mottles in an essentially gray matrix in the subsoil. Nodules or concretions of iron or manganese are commonly formed under these conditions.

As silicate clay forms from primary minerals, some iron is released as hydrated oxide. These oxides are various shades of red. Even if present in small amounts, they give a brownish color to the soil material. They are largely responsible for the strong brown, yellowish brown, or reddish brown colors that dominate the subsoil of many soils in Clay County.

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Glossary

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Cool slopes. A land surface that is inclined toward the north and east (315 to 135 degrees on the compass).

Cove. A walled and rounded or cirque-like opening at the head of a small steep valley.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Debris. Any surficial accumulation of loose material detached from rock masses by chemical or mechanical means, as by decay and disintegration. It occurs in the place where it was formed, or it has been transported by water or ice and redeposited. It consists of rock fragments, finer grained earth material, and, sometimes, organic matter.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. A relatively small, linear depression that, at some time, carries water and either lacks a defined channel or only has a small defined channel.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Fine earth. That portion of the soil consisting of particles less than 2 millimeters in diameter. Particles and rock fragments 2 millimeters in diameter or larger are not included.

Flooding frequency class. The classes of flooding are defined as follows:

None.—No reasonable possibility of flooding.

Rare.—Flooding unlikely but possible under unusual weather conditions; one to five times in 100 years.

Occasional.—Flooding is expected infrequently under usual weather conditions; 6 to 50 times in 100 years.

Frequent.—Flooding is likely to occur often under unusual conditions; more than 50 times in 100 years.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Footslope. The inclined surface at the base of a hill.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Highwall. Vertical wall of overburden exposed during surface mining.

Hillside. The steeper part of a hill between its ridgetop and any drainageway or stream. Hillside positions include shoulder slopes, side slopes, benches, head slopes, coves, and footslopes. Complex hillsides may include two or more shoulder-to-footslope sequences.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or

unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Landform. Any physical, recognizable form or feature on the earth's surface that has a characteristic shape and has formed through natural causes.

Landscape. A collection of related natural landforms; generally, the part of the land surface that the eye can comprehend in a single view.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Natural levee. A long, broad, low ridge or embankment of sand and coarse silt, built by a stream on its flood plain and along both banks of its channel. It is made up of wedge-shaped deposits, which are the coarsest suspended-load material, that slope gently away from the stream.

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

No-tillage. A method of growing crops that involves no seedbed preparation other than opening a small slit or punching a hole into the soil in order to place the seed at the intended depth. There is no cultivation; chemical weed and other pest control are used.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Parent material. The unconsolidated organic and mineral material in which soil forms.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridgetop. A long, narrow, elevation of the land surface, usually sharp crested with steep sides and forming an extended upland between valleys.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. The part of the hillside between the ridgetop and a drainageway that is generally linear up and down the slope and across the contour.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent
Sloping	6 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 35 percent
Very steep	35 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil depth classes. Terms used in this survey to describe soil depth are:

Shallow	less than 20 inches deep
Moderately deep	20 to 40 inches deep
Deep	40 to 60 inches deep
Very deep	more than 60 inches deep

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Spur. A secondary divide between minor drainage systems. It generally has an inverted V-shape and is of lower elevation than the associated ridge.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream representing the remnants of an abandoned flood plain stream bed or valley floor produced during a former state of fluvial erosion or deposition. Erosional surfaces cut into bedrock and thinly mantled with stream deposits are called "strath terraces." Remnants of constructional valley floors thickly mantled with alluvium are called alluvial terraces.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Structural bench. A platform-like, nearly level to gently inclined erosional surface developed on resistant strata in areas where valleys are cut in alternating strong and weak layers with an essentially horizontal attitude. Structural benches are bedrock controlled and, in contrast to stream terraces, have no geomorphic implication of former, partial erosion cycles and base-level controls nor do they represent a stage of flood-plain development following an episode of valley trenching.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tillage. The mechanical manipulation of the soil profile for any purpose, but in agriculture it is generally restricted to modifying soil conditions, managing crop residue and weeds, and incorporating chemicals for crop production.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Warm slopes. A land surface that is inclined toward the south and west (135 to 315 degrees on the compass).

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Manchester, Kentucky)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	43.8	20.4	34.0	71	-14	68	3.89	2.29	5.32	8	5.9
February----	48.5	22.4	37.4	75	-5	93	3.64	2.01	5.09	7	4.0
March-------	59.0	31.0	47.2	83	9	264	4.46	2.56	6.16	8	1.0
April-------	68.3	39.1	55.7	88	21	479	4.01	2.47	5.39	7	0.3
May---------	75.9	49.2	63.6	89	29	736	4.64	2.85	6.25	8	0.0
June--------	82.3	57.8	70.6	93	40	918	4.03	2.26	5.60	7	0.0
July--------	85.5	62.6	74.5	95	47	1,068	5.23	3.43	6.86	8	0.0
August------	84.2	61.8	73.6	95	46	1,039	3.60	1.92	5.08	6	0.0
September---	78.9	54.6	67.6	92	35	826	3.93	2.25	5.66	6	0.0
October-----	69.4	40.5	56.4	85	21	513	3.25	1.52	4.74	5	0.0
November----	59.1	32.4	47.2	80	12	251	4.06	2.47	5.49	7	0.8
December----	48.4	25.0	38.4	72	-1	112	4.30	2.09	6.22	7	2.2
Yearly:											
Average---	66.9	41.4	55.5	---	---	---	---	---	---	---	---
Extreme---	---	---	---	96	-14	---	---	---	---	---	---
Total-----	---	---	---	---	---	6,366	49.04	39.54	55.87	84	14.2

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Manchester, Kentucky)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 15	May 4	May 19
2 years in 10 later than--	Apr. 10	Apr. 28	May 14
5 years in 10 later than--	Apr. 2	Apr. 17	May 3
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 16	Oct. 8	Sept. 29
2 years in 10 earlier than--	Oct. 22	Oct. 13	Oct. 3
5 years in 10 earlier than--	Nov. 2	Oct. 25	Oct. 12

Table 3.--Growing Season

(Recorded in the period 1961-90 at Manchester, Kentucky)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	191	163	144
8 years in 10	199	172	151
5 years in 10	213	190	163
2 years in 10	228	207	175
1 year in 10	236	216	181

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
Ag	Allegheny loam, rarely flooded	428	0.1
AlB	Allegheny loam, 2 to 6 percent slopes	368	0.1
AlC	Allegheny loam, 6 to 12 percent slopes	162	0.1
BaB	Barbourville loam, 2 to 8 percent slopes	167	0.1
Bo	Bonnie silt loam, occasionally flooded	365	0.1
Ca	Cotaco loam, rarely flooded	669	0.2
CoB	Cottonbend loam, 2 to 6 percent slopes	672	0.2
Cr	Craigsville-Philo complex, 0 to 3 percent slopes, rarely flooded	3,402	1.1
Dm	Dumps, Mine; tailings; and Tipples	332	0.1
FbC	Fairpoint and Bethesda soils, 2 to 20 percent slopes	4,186	1.4
FbF	Fairpoint and Bethesda soils, 20 to 70 percent slopes	13,999	4.6
GhF	Gilpin-Highsplint complex, rocky, 60 to 100 percent slopes	1,521	0.5
GlC2	Gilpin-Shelocta complex, 3 to 12 percent slopes, eroded	1,107	0.4
GlD2	Gilpin-Shelocta complex, 12 to 20 percent slopes, eroded	2,363	0.8
GlE2	Gilpin-Shelocta complex, 20 to 35 percent slopes, eroded	8,856	2.9
GsF	Gilpin-Shelocta-Sequoia complex, 25 to 55 percent slopes, very stony	67,501	22.4
LoB	Lonewood loam, 2 to 6 percent slopes	231	0.1
LoC2	Lonewood loam, 6 to 12 percent slopes, eroded	924	0.3
Ph	Philo fine sandy loam, rarely flooded	683	0.2
Pl	Philo fine sandy loam, occasionally flooded	2,158	0.7
Po	Pope loam, rarely flooded	1,170	0.4
Pp	Pope loam, occasionally flooded	1,983	0.7
Pr	Pope fine sandy loam, occasionally flooded	4,004	1.3
ShB	Shelocta gravelly silt loam, 2 to 6 percent slopes	440	0.1
ShC	Shelocta gravelly silt loam, 6 to 12 percent slopes	792	0.3
SkF	Shelocta-Cloverlick-Kimper complex, 35 to 75 percent slopes, very stony	84,265	28.0
SlF	Shelocta-Highsplint complex, 35 to 75 percent slopes, very stony	93,990	31.2
Sn	Stendal silt loam, occasionally flooded	474	0.2
St	Stokly fine sandy loam, occassionally flooded	1,070	0.4
Ud	Udorthents-Urban land complex, rarely flooded	528	0.2
UrC	Udorthents-Urban land complex, 3 to 15 percent slopes	1,089	0.4
UrE	Udorthents-Urban land complex, 15 to 35 percent slopes	958	0.3
W	Water	344	0.1
Ye	Yeager fine sandy loam, occasionally flooded	169	0.1
	Total	301,370	100.0

Table 5.--Land Capability Classes and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Tobacco	Wheat	Grass-legume hay	Pasture
		Bu	Lb	Bu	Ton	AUM*
Ag------------------------ Allegheny	I	130	3,100	45	3.5	7.0
AlB----------------------- Allegheny	IIe	120	3,000	45	3.5	7.0
AlC----------------------- Allegheny	IIIe	105	2,750	40	3.5	7.0
BaB----------------------- Barbourville	IIe	130	3,100	50	4.0	7.5
Bo------------------------ Bonnie, drained	IIw	90	---	---	3.0	6.0
Bo------------------------ Bonnie, undrained	Vw	---	---	---	---	5.5
Ca------------------------ Cotaco	IIw	110	2,400	35	3.0	6.0
CoB----------------------- Cottonbend	IIe	115	2,800	45	3.5	7.0
Cr:						
Craigsville--------------	IIIs	92	---	32	2.2	---
Philo--------------------	IIw	100	2,300	35	3.0	8.0
Dm**. Dumps, mine	VIIIs	---	---	---	---	---
FbC----------------------- Fairpoint and Bethesda	VIs	---	---	---	---	4.0
FbF----------------------- Fairpoint and Bethesda	VIIe	---	---	---	---	---
GhF----------------------- Gilpin-Highsplint	VIIe	---	---	---	---	---
GlC2---------------------- Gilpin-Shelocta	IIIe	100	2,200	40	3.0	7.0
GlD2---------------------- Gilpin-Shelocta	IVe	90	2,000	32	2.5	5.0
GlE2---------------------- Gilpin-Shelocta	VIe	---	---	---	---	4.5
GsF----------------------- Gilpin-Shelocta-Sequoia	VIIe	---	---	---	---	---
LoB----------------------- Lonewood	IIe	100	2,300	40	3.0	7.0

See footnotes at end of table.

Table 5.--Land Capability Classes and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Tobacco	Wheat	Grass-legume hay	Pasture
		Bu	Lb	Bu	Ton	AUM*
LoC2 Lonewood	IIIe	90	2,100	35	3.0	7.0
Ph, Pl Philo	IIw	100	2,300	35	3.0	6.0
Po Pope	I	110	2,800	45	3.5	7.0
Pp, Pr Pope	IIw	110	2,800	45	3.5	7.0
ShB Shelocta	IIe	110	2,500	45	4.0	8.0
ShC Shelocta	IIIe	100	2,300	40	3.5	7.0
SkF Shelocta-Cloverlick-Kimper	VIIe	---	---	---	---	---
SlF Shelocta-Highsplint	VIIe	---	---	---	---	---
Sn Stendal	IIw	100	2,100	35	3.5	6.5
St Stokly	IIw	100	2,000	30	3.0	6.0
Ud**. Udorthents-Urban land						
UrC**. Udorthents-Urban land						
UrE**. Udorthents-Urban land						
W**. Water						
Ye Yeager	IIw	70	1,600	20	3.0	5.5

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

Table 6.--Capability Classes and Subclasses

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	1,598	---	---	---
II	14,350	1,880	12,470	---
III	5,298	2,954	---	2,344
IV	2,426	2,426	---	---
V	---	---	---	---
VI	13,206	8,856	---	4,350
VII	261,244	261,244	---	---
VIII	332	---	---	332

Table 7.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
Ag, AlB, AlC---- Allegheny	Slight	Slight	Slight	Severe	Yellow-poplar-------	93	95	Eastern white pine, yellow-poplar, black walnut, shortleaf pine, white oak, white ash, northern red oak.
					Virginia pine-------	72	112	
					Sugar maple---------	---	---	
					Northern red oak----	---	---	
					Red maple-----------	---	---	
					Black oak-----------	78	60	
					White oak-----------	70	52	
BaB------------- Barbourville	Slight	Slight	Slight	Severe	Yellow-poplar-------	102	124	Eastern white pine, shortleaf pine, black walnut, yellow-poplar, white ash, northern red oak, white oak.
					Green ash-----------	---	---	
					White oak-----------	---	---	
					Sugar maple---------	---	---	
					American sycamore---	---	---	
Bo-------------- Bonnie	Slight	Severe	Moderate	Severe	Pin oak-------------	90	86	American sycamore, sweetgum, pin oak.
					Sweetgum------------	90	106	
					American sycamore---	---	---	
Ca-------------- Cotaco	Slight	Slight	Slight	Severe	Virginia pine-------	81	123	Eastern white pine, yellow-poplar, white oak, shortleaf pine.
					Yellow-poplar-------	95	98	
					Black oak-----------	87	69	
					Sweet birch---------	---	---	
CoB------------- Cottonbend	Slight	Slight	Slight	Severe	Yellow-poplar-------	86	84	Yellow-poplar, black walnut, loblolly pine, shortleaf pine, white ash.
					Northern red oak----	78	56	
					Shortleaf pine------	---	---	
					Sweetgum------------	---	---	
					White oak-----------	---	---	
Cr**:								
Craigsville----	Slight	Slight	Slight	Moderate	Northern red oak----	80	62	Eastern white pine, yellow-poplar, white ash, shortleaf pine, black walnut.
					Yellow-poplar-------	95	98	
					Eastern white pine--	90	166	
					American sycamore---	---	---	
					Green ash-----------	---	---	
					Red maple-----------	---	---	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
Cr**:								
Philo----------	Slight	Slight	Slight	Severe	Northern red oak----	86	68	Eastern white pine, yellow-poplar,white ash, shortleaf pine.
					Yellow-poplar-------	102	110	
					Virginia pine-------	74	114	
					Black oak-----------	85	67	
					White oak-----------	85	56	
					Green ash-----------	---	---	
					American elm--------	---	---	
FbC**:								
Fairpoint------	Slight	Slight	Moderate	Moderate	Loblolly pine-------	74	100	Eastern white pine, black locust, loblolly pine, shortleaf pine, white ash, white oak.
					Yellow-poplar-------	85	81	
					Eastern white pine--	85	155	
					Black locust--------	---	---	
					Sweetgum------------	88	101	
Bethesda-------	Slight	Slight	Severe	Moderate	Loblolly pine-------	69	101	Eastern white pine, red pine, black locust, yellow-poplar, white ash, northern red oak, white oak.
					Shortleaf pine------	63	95	
					Chestnut oak--------	73	55	
FbF**:								
Fairpoint------ (cool slopes)	Severe	Severe	Moderate	Moderate	Loblolly pine-------	82	114	Eastern white pine, black locust, yellow-poplar, shortleaf pine, white oak, loblolly pine.
					Eastern white pine--	95	176	
					Northern red oak----	75	57	
Bethesda------- (cool slopes)	Severe	Severe	Severe	Moderate	Yellow-poplar-------	95	98	Eastern white pine, loblolly pine, black locust, shortleaf pine, yellow-poplar, white oak.
					Black locust--------	75	---	
					Red maple-----------	---	---	
					American sycamore---	77	73	
					Chestnut oak--------	---	---	
					Red maple-----------	---	---	
FbF**:								
Fairpoint------ (warm slopes)	Severe	Severe	Moderate	Moderate	Loblolly pine-------	74	100	Eastern white pine, black locust, loblolly pine, shortleaf pine, white oak.
					Eastern white pine--	85	155	
					Yellow-poplar-------	85	81	
					Scarlet oak---------	72	54	
					Black locust--------	---	---	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
FbF**:								
Bethesda (warm slopes)	Severe	Severe	Severe	Moderate	Loblolly pine	69	91	Eastern white pine, black locust, loblolly pine, shortleaf pine, white oak.
					Shortleaf pine	63	95	
					Black oak	73	55	
					Black locust	---	---	
GhF**:								
Gilpin (cool slopes)	Severe	Severe	Slight	Moderate	Northern red oak	---	---	Virginia pine, eastern white pine, black cherry, yellow-poplar.
					Yellow-poplar	90	90	
					White oak	75	57	
					Chestnut oak	---	---	
					American beech	---	---	
					Sugar maple	---	---	
					Eastern hemlock	---	---	
Highsplint (cool slopes)	Severe	Severe	Slight	Moderate	Yellow-poplar	100	107	Yellow-poplar, eastern white pine, shortleaf pine, northern red oak.
					White oak	---	---	
					Sugar maple	---	---	
					Northern red oak	---	---	
					American beech	---	---	
					Eastern hemlock	---	---	
					Hickory	---	---	
GhF**:								
Gilpin (warm slopes)	Severe	Severe	Moderate	Moderate	White oak	61	44	Shortleaf pine, lodlolly pine, white oak.
					Black oak	---	---	
					Scarlet oak	---	---	
					Chestnut oak	---	---	
					American beech	---	---	
Highsplint (warm slopes)	Severe	Severe	Moderate	Moderate	White oak	82	64	White oak, shortleaf pine, eastern white pine.
					American beech	---	---	
					Chestnut oak	---	---	
					Red maple	---	---	
GlC2**:								
Gilpin	Slight	Slight	Slight	Moderate	Yellow-poplar	90	90	Shortleaf pine, eastern white pine, yellow-poplar.
					White oak	75	57	
					Chestnut oak	80	62	
					Virginia pine	71	110	
					Scarlet oak	76	58	
					Black oak	80	62	
Shelocta	Slight	Slight	Slight	Severe	White oak	77	61	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow-poplar	107	110	
					American beech	---	---	
					Shortleaf pine	77	124	
					Red maple	---	---	
					Scarlet oak	80	61	
					Black oak	79	61	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
GlD2**, GlE2**:								
Gilpin---------- (cool slopes)	Moderate	Moderate	Slight	Moderate	Yellow-poplar-------	90	90	Northern red oak, eastern white pine, white oak, yellow-poplar.
					White oak-----------	75	57	
					Chestnut oak--------	80	62	
					Scarlet oak---------	76	58	
					Black oak-----------	80	62	
					Virginia pine-------	71	110	
Shelocta------- (cool slopes)	Moderate	Moderate	Slight	Severe	White oak-----------	77	61	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow-poplar-------	107	110	
					American beech------	---	---	
					Shortleaf pine------	77	124	
					Red maple-----------	81	---	
					Scarlet oak---------	80	61	
					Black oak-----------	79	61	
GlD2**, GlE2**:								
Gilpin---------- (warm slopes)	Moderate	Moderate	Moderate	Moderate	White oak-----------	61	44	Shortleaf pine, white oak, loblolly pine.
					Black oak-----------	74	56	
					Scarlet oak---------	72	54	
					Chestnut oak--------	68	50	
					Shortleaf pine------	60	88	
Shelocta------- (warm slopes)	Moderate	Moderate	Moderate	Severe	White oak-----------	65	47	Shortleaf pine, white oak, eastern white pine.
					Black oak-----------	70	52	
					Scarlet oak---------	68	50	
					Yellow-poplar-------	92	93	
					Chestnut oak--------	68	50	
					American beech------	---	---	
					Red maple-----------	---	---	
GsF**:								
Gilpin---------- (cool slopes)	Severe	Severe	Slight	Moderate	Yellow-poplar-------	90	90	Northern red oak, white oak, eastern white pine, shortleaf pine, yellow-poplar.
					White oak-----------	75	57	
					Chestnut oak--------	80	62	
					Scarlet oak---------	76	58	
					Black oak-----------	80	62	
Shelocta------- (cool slopes)	Severe	Severe	Slight	Severe	White oak-----------	79	61	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow-poplar-------	102	110	
					American beech------	---	---	
					Shortleaf pine------	77	126	
					Red maple-----------	81	---	
					Scarlet oak---------	80	62	
					Northern red oak----	79	61	
					Sugar maple---------	---	---	
					Hickory-------------	---	---	
Sequoia-------- (cool slopes)	Severe	Severe	Severe	Moderate	Northern red oak----	70	52	Loblolly pine, shortleaf pine, eastern white pine, white oak.
					Chestnut oak--------	---	---	
					Sugar maple---------	---	---	
					White oak-----------	63	45	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
GsF**:								
Gilpin---------(warm slopes)	Severe	Severe	Moderate	Moderate	White oak-----------	61	44	Shortleaf pine, white oak, loblolly pine.
					Black oak-----------	74	56	
					Scarlet oak---------	72	54	
					Chestnut oak--------	68	50	
					Shortleaf pine------	60	88	
Shelocta-------(warm slopes)	Severe	Severe	Moderate	Severe	White oak-----------	65	47	Shortleaf pine, white oak, eastern white pine.
					Black oak-----------	70	52	
					Scarlet oak---------	68	50	
					Yellow-poplar-------	92	93	
					American beech------	---	---	
					Chestnut oak--------	68	50	
					Red maple-----------	---	---	
Sequoia--------(warm slopes)	Severe	Severe	Severe	Moderate	Northern red oak----	70	52	Loblolly pine, shortleaf pine, eastern white pine, white oak.
					Virginia pine-------	71	110	
					Shortleaf pine------	63	95	
LoB, LoC2-------Lonewood	Slight	Slight	Slight	Severe	Yellow-poplar-------	93	95	Yellow-poplar, loblolly pine, shortleaf pine, Virginia pine, eastern white pine.
					Shortleaf pine------	80	130	
					Virginia pine-------	72	112	
					White oak-----------	70	52	
					Sweetgum------------	---	---	
Ph, Pl----------Philo	Slight	Slight	Slight	Severe	Northern red oak----	86	68	Eastern white pine, yellow-poplar, white ash.
					Yellow-poplar-------	102	110	
					Virginia pine-------	74	114	
					Black oak-----------	85	67	
					White oak-----------	74	56	
					White ash-----------	---	---	
					Green ash-----------	---	---	
					American elm--------	---	---	
Po, Pp, Pr------Pope	Slight	Slight	Slight	Severe	Yellow-poplar-------	96	100	Eastern white pine, yellow-poplar, black walnut, white oak, northern red oak, white ash, shortleaf pine.
					American beech------	---	---	
					White oak-----------	80	62	
					American sycamore---	---	---	
					Northern red oak----	---	---	
					Green ash-----------	---	---	
					Red maple-----------	---	---	
ShB, ShC--------Shelocta	Slight	Slight	Slight	Severe	White oak-----------	77	61	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow-poplar-------	102	110	
					American beech------	---	---	
					Shortleaf pine------	77	124	
					Red maple-----------	81	---	
					Scarlet oak---------	80	61	
					Sugar maple---------	---	---	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
SkF**:								
Shelocta	Severe	Severe	Slight	Severe	White oak	79	61	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow-poplar	102	110	
					American beech	---	---	
					Red maple	81	---	
					Chestnut oak	79	61	
					Northern red oak	---	---	
					Sugar maple	---	---	
Cloverlick	Severe	Severe	Slight	Severe	Northern red oak	85	67	Yellow-poplar, white ash, northern red oak, shortleaf pine, eastern white pine.
					Sugar maple	---	---	
					Yellow-poplar	---	---	
					American beech	---	---	
Kimper	Severe	Severe	Slight	Severe	White oak	72	54	Yellow-poplar, white ash, northern red oak, white oak, eastern white pine, shortleaf pine, black walnut.
					Yellow-poplar	112	119	
					Sugar maple	---	---	
					American basswood	---	---	
					American beech	---	---	
					Sweet birch	---	---	
					Northern red oak	75	57	
					Red maple	---	---	
					Black locust	---	---	
SlF**:								
Shelocta	Severe	Severe	Moderate	Severe	White oak	65	47	Eastern white pine, shortleaf pine, white oak.
					Yellow-poplar	92	93	
					American beech	---	---	
					Red maple	55	---	
					Scarlet oak	68	50	
					Northern red oak	---	---	
					Black oak	73	52	
					Chestnut oak	100	107	
Highsplint	Severe	Severe	Moderate	Moderate	Yellow-poplar	100	107	Yellow-poplar, eastern white pine, shortleaf pine, northern red oak.
					White oak	82	64	
					Red maple	---	---	
					Chestnut oak	---	---	
					American beech	---	---	
					Pitch pine	---	---	
Sn Stendal	Slight	Moderate	Slight	Severe	Pin oak	90	86	American sycamore, red maple, white ash, eastern white pine.
					Sweetgum	85	93	
					Yellow-poplar	90	90	
					Virginia pine	90	9	
					Cottonwood	88	7	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
St-------------- Stokly	Slight	Moderate	Slight	Severe	Yellow-poplar-------	90	90	Eastern white pine, American sycamore, sweetgum, yellow-poplar.
					White oak-----------	80	62	
					Black oak-----------	80	62	
					Red maple-----------	---	---	
					American sycamore---	---	---	
					White ash-----------	---	---	
					River birch---------	---	---	
					Sweetgum------------	---	---	
Ye-------------- Yeager	Slight	Slight	Slight	Moderate	Yellow-poplar-------	90	90	Yellow-poplar, white oak, northern red oak, sweetgum, eastern white pine.
					Sweetgum------------	90	106	
					Hackberry-----------	---	---	
					Boxelder------------	---	---	
					Green ash-----------	---	---	
					Sugar maple---------	---	---	
					American beech------	---	---	
					American sycamore---	---	---	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

Table 8.--Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ag-------------------- Allegheny	Severe: flooding.	Slight----------	Slight----------	Slight----------	Slight.
AlB------------------- Allegheny	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
AlC------------------- Allegheny	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
BaB------------------- Barbourville	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
Bo-------------------- Bonnie	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ca-------------------- Cotaco	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
CoB------------------- Cottonbend	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
Cr*:					
Craigsville----------	Severe: flooding.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones, large stones.
Philo----------------	Severe: flooding.	Moderate: wetness.	Moderate: small stones, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
Dm*. Dumps, mine					
FbC*:					
Fairpoint------------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
Bethesda-------------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
FbF*:					
Fairpoint------------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
Bethesda-------------	Variable-------	Variable--------	Variable--------	Variable--------	Variable.
GhF*:					
Gilpin---------------	Severe: slope, too stony.	Severe: slope.	Severe: slope.	Severe: slope, too stony.	Severe: slope.
Highsplint-----------	Severe: slope, too stony.	Severe: slope.	Severe: slope, small stones.	Severe: slope, too stony.	Severe: slope.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GlC2*:					
Gilpin	Moderaate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: thin layer.
Shelocta	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
GlD2*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Shelocta	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
GlE2*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Shelocta	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
GsF*:					
Gilpin	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, large stones, slope.
Shelocta	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Sequoia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LoB Lonewood	Slight	Slight	Moderate: slope.	Slight	Slight.
LoC2 Lonewood	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Ph Philo	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Pl Philo	Severe: flooding.	Moderate: wetness.	Moderate: flooding, wetness.	Moderate: wetness.	Moderate: wetness, flooding.
Po Pope	Severe: flooding.	Slight	Slight	Slight	Slight.
Pp Pope	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Pr-------------------- Pope	Severe: flooding.	Slight----------	Moderate: small stones, flooding.	Slight----------	Moderate: flooding.
ShB------------------- Shelocta	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
ShC------------------- Shelocta	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
SkF*:					
Shelocta-------------	Severe: slope, too stony.	Severe: slope.	Severe: slope.	Severe: slope, too stony.	Severe: slope.
Cloverlick-----------	Severe: slope, small stones, too stony.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, too stony.	Severe: small stones, slope.
Kimper---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too stony.	Severe: slope.
SlF*:					
Shelocta-------------	Severe: slope, too stony.	Severe: slope.	Severe: slope, small stones.	Severe: slope, too stony.	Severe: slope.
Highsplint-----------	Severe: slope, too stony.	Severe: slope.	Severe: slope.	Severe: slope, too stony.	Severe: slope.
Sn-------------------- Stendal	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
St-------------------- Stokly	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ud*, UrC*, UrE*: Udorthents.					
Urban land.					
W*. Water					
Ye-------------------- Yeager	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: droughty, flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 9.--Wildlife Habitat

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for-		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ag-----------------Allegheny	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AlB----------------Allegheny	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AlC----------------Allegheny	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BaB----------------Barbourville	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Bo-----------------Bonnie	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Ca-----------------Cotaco	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
CoB----------------Cottonbend	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Cr*:										
Craigsville-------	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor.	Fair	Fair	Very poor.
Philo-------------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Dm*. Dumps, mine										
FbC*:										
Fairpoint---------	Fair	Fair	Poor	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Bethesda----------	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
FbF*:										
Fairpoint---------	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Bethesda----------	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GhF*:										
Gilpin------------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Highsplint--------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for: Openland wildlife	Woodland wildlife	Wetland wildlife
GlC2*:										
Gilpin	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Shelocta	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GlD2*:										
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Shelocta	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GlE2*:										
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Shelocta	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GsF*:										
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Shelocta	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Sequoia	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
LoB Lonewood	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LoC2 Lonewood	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ph, Pl Philo	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Po, Pp, Pr Pope	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ShB Shelocta	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ShC Shelocta	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SkF*:										
Shelocta	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Cloverlick	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Kimper	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
SlF*:										
Shelocta	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Highsplint	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Sn: Stendal	Poor	Fair	Fair	Good	Fair	Good	Fair	Fair	Good	Fair.
St: Stokly	Poor	Fair	Fair	Good	Fair	Fair	Fair	Fair	Good	Fair.
Ud*, UrC*, UrE*: Udorthents.										
Urban land.										
W*. Water										
Ye: Yeager	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 10.--Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ag: Allegheny	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
AlB: Allegheny	Slight	Slight	Slight	Slight	Slight	Slight.
AlC: Allegheny	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.
BaB: Barbourville	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
Bo: Bonnie	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
Ca: Cotaco	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Moderate: wetness.
CoB: Cottonbend	Slight	Slight	Slight	Slight: slope.	Slight	Slight.
Cr*:						
Craigsville	Severe: cutbanks cave, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: large stones.	Moderate: flooding, large stones.
Philo	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding.
Dm*. Dumps, mine						
FbC*:						
Fairpoint	Moderate: large stones, slope.	Severe: unstable fill.	Severe: unstable fill.	Severe: slope, unstable fill.	Severe: unstable fill.	Severe: droughty, large stones.
Bethesda	Moderate: dense layer, large stones, slope.	Severe: unstable fill.	Severe: unstable fill.	Severe: slope, unstable fill.	Severe: unstable fill.	Severe: droughty, large stones.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
FbF*:						
Fairpoint	Severe: slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: large stones, droughty, slope.
Bethesda	Severe: slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: droughty, slope, large stones
GhF*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Highsplint	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
GlC2*:						
Gilpin	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: slope.	Moderate: depth to rock, slope.
Shelocta	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.
GlD2*, GlE2*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GsF*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Sequoia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
LoB Lonewood	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Slight	Slight	Slight.
LoC2 Lonewood	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Moderate: slope.	Slight	Moderate: slope.

See footnote at end of table.

Table 10.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ph, Pl------------ Philo	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding.
Po---------------- Pope	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
Pp, Pr------------ Pope	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
ShB--------------- Shelocta	Slight---------	Slight---------	Moderate: depth to rock.	Slight---------	Slight---------	Moderate: small stones.
ShC--------------- Shelocta	Moderate: slope.	Moderate: slope.	Moderate: slope, depth to rock.	Moderate slope.	Moderate: slope.	Moderate: small stones, slope.
SkF*:						
Shelocta---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cloverlick-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Kimper-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
SlF*:						
Shelocta---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Highsplint-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Sn---------------- Stendal	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
St---------------- Stokly	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.
Ud*, UrC*, UrE*: Udorthents.						
Urban land.						
W*. Water						
Ye---------------- Yeager	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 11.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ag: Allegheny	Moderate: flooding.	Moderate: seepage.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
AlB: Allegheny	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
AlC: Allegheny	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
BaB: Barbourville	Slight	Moderate: seepage.	Severe: seepage.	Severe: seepage.	Moderate: too clayey.
Bo: Bonnie	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Ca: Cotaco	Severe: wetness.	Moderate: seepage,	Severe: wetness.	Severe: wetness.	Moderate: too clayey.
CoB: Cottonbend	Moderate: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Poor: too clayey.
Cr*:					
Craigsville	Severe: poor filter, large stones.	Severe: seepage, large stones.	Severe: seepage, large stones.	Severe: seepage.	Poor: seepage, large stones.
Philo	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage.	Severe: flooding, wetness.	Fair: wetness.
Dm*. Dumps, mine					
FbC*:					
Fairpoint	Severe: percs slowly, unstable fill.	Severe: slope, unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.
Bethesda	Severe: percs slowly, unstable fill.	Severe: slope, unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.
FbF*:					
Fairpoint	Severe: percs slowly, slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Poor: small stones, slope.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
FbF*:					
Bethesda	Severe: percs slowly, slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Poor: small stones, slope.
GhF*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock.
Highsplint	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: small stones, slope.
GlC2*:					
Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Shelocta	Moderate: percs slowly, depth to rock.	Severe: slope.	Severe: depth to rock.	Slight	Fair: depth to rock, too clayey, small stones.
GlD2*, GlE2*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: slope, depth to rock.
Shelocta	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
GsF*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Shelocta	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Sequoia	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
LoB Lonewood	Moderate: depth to rock.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: depth to rock, too clayey.
LoC2 Lonewood	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: depth to rock, too clayey, slope.

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ph, Pl------------- Philo	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage.	Severe: flooding, wetness, seepage	Fair: wetness.
Po----------------- Pope	Moderate: flooding.	Severe: seepage, flooding.	Severe: seepage.	Severe: seepage.	Good.
Pp, Pr------------- Pope	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.
ShB---------------- Shelocta	Moderate: percs slowly, depth to rock.	Moderate: slope.	Moderate: depth to rock.	Moderate: depth to rock.	Poor: depth to rock, too clayey, small stones.
ShC---------------- Shelocta	Moderate: percs slowly, slope, depth to rock.	Severe: slope.	Moderate: depth to rock.	Moderate: slope, depth to rock.	Poor: depth to rock, too clayey, small stones.
SkF*:					
Shelocta-----------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Cloverlick---------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Kimper-------------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: small stones, slope.
SlF*:					
Shelocta-----------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Highsplint---------	Severe: slope.	Severe: seepage, slope.	Severe: slope, seepage.	Severe: seepage, slope.	Poor: small stones, slope.
Sn----------------- Stendal	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
St----------------- Stokly	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
Ud*, UrC*, UrE*: Udorthents.					
Urban land.					

See footnote at end of table.

Table 11.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
W*. Water					
Ye------------------ Yeager	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12.--Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ag, AlB: Allegheny	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
AlC: Allegheny	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, slope.
BaB: Barbourville	Fair.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Bo: Bonnie	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ca: Cotaco	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
CoB: Cottonbend	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Cr*:				
Craigsville	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim.
Philo	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Dm*. Dumps, mine				
FbC*:				
Fairpoint	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Bethesda	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
FbF*:				
Fairpoint	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
FbF*:				
Bethesda	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
GhF*:				
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Highsplint	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
GlC2*:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Shelocta	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
GlD2*:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Shelocta	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
GlE2*:				
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Shelocta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
GsF*:				
Gilpin	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Shelocta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Sequoia	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
LoB-------------------- Lonewood	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
LoC2------------------- Lonewood	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Ph, Pl----------------- Philo	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Po, Pp, Pr------------- Pope	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
ShB, ShC--------------- Shelocta	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
SkF*:				
Shelocta--------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too stony, small stones, area reclaim, slope.
Cloverlick------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too stony, small stones, area reclaim, slope.
Kimper----------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too stony, small stones, area reclaim, slope.
SlF*:				
Shelocta--------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too stony, small stones, area reclaim, slope.
Highsplint------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too stony, small stones, area reclaim, slope.
Sn--------------------- Stendal	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, small stones.
St--------------------- Stokly	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ud*, UrC*, UrE*:				
Udorthents.				
Urban land.				
W*. Water				
Ye-------------------- Yeager	Good-----------------	Probable-------------	Probable-------------	Fair: small stones, area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 13.--Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Ag: Allegheny	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Favorable.
AlB: Allegheny	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Favorable	Favorable.
AlC: Allegheny	Severe: slope.	Moderate: piping.	Deep to water	Slope	Slope.
BaB: Barbourville	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Bo: Bonnie	Slight	Severe: wetness.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
Ca: Cotaco	Moderate: seepage.	Moderate: piping, wetness.	Favorable	Erodes easily, wetness.	Erodes easily, droughty.
CoB: Cottonbend	Moderate: slope.	Moderate: piping.	Deep to water	Favorable	Favorable.
Cr*:					
Craigsville	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, too sandy, soil blowing.	Large stones, droughty.
Philo	Severe: seepage.	Severe: piping, wetness.	Cutbanks cave	Erodes easily, wetness.	Erodes easily.
Dm*. Dumps, mine					
FbC*:					
Fairpoint	Severe: slope.	Severe: piping.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Bethesda	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
FbF*:					
Fairpoint	Severe: slope.	Severe: piping.	Deep to water	Slope, large stones, slippage.	Large stones, slope, droughty.
Bethesda	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope, large stones, slippage.	Large stones, slope, droughty.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
GhF*:					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Highsplint	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
GlC2*:					
Gilpin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Large stones, depth to rock.	Large stones, depth to rock.
Shelocta	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Favorable.
GlD2*, GlE2*:					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Shelocta	Severe: slope.	Moderate: piping.	Deep to water	Slope	Slope.
GsF*:					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Shelocta	Severe: slope.	Moderate: piping.	Deep to water	Slope	Slope.
Sequoia	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily.
LoB Lonewood	Moderate: seepage, depth to rock, slope.	Moderate: thin layer, piping.	Deep to water	Erodes easily	Erodes easily.
LoC2 Lonewood	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Ph Philo	Severe: seepage.	Severe: piping, wetness.	Favorable	Wetness	Favorable.
Pl Philo	Severe: seepage.	Severe: piping, wetness.	Flooding	Wetness	Favorable.
Po, Pp Pope	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Pr---------------- Pope	Severe: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
ShB--------------- Shelocta	Slight------------	Moderate: piping.	Deep to water----	Favorable--------	Favorable.
ShC--------------- Shelocta	Severe: slope.	Moderate: piping.	Deep to water----	Slope------------	Slope.
SkF*:					
Shelocta---------	Severe: slope.	Moderate: piping.	Deep to water----	Slope------------	Slope.
Cloverlick-------	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope, large stones.	Large stones, slope.
Kimper-----------	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope------------	Slope.
SlF*:					
Shelocta---------	Severe: slope.	Moderate: piping.	Deep to water----	Slope------------	Slope.
Highsplint-------	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope, large stones.	Large stones, slope, droughty.
Sn---------------- Stendal	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
St---------------- Stokly	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave.	Wetness----------	Wetness.
Ud*, UrC*, UrE*: Udorthents.					
Urban land.					
W*. Water					
Ye---------------- Yeager	Severe: seepage.	Severe: seepage, piping.	Deep to water----	Favorable--------	Droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 14.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct						Pct
Ag, AlB, AlC-----Allegheny	0-8	Loam-------------	ML, CL	A-4	0	90-100	80-100	65-100	55-95	<35	NP-10
	8-56	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	80-100	65-95	35-80	<35	NP-15
	56-80	Clay loam, sandy loam, gravelly sandy loam.	SM, GC, ML, CL	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-95	20-75	<35	NP-15
BaB--------------Barbourville	0-20	Loam-------------	ML, CL-ML	A-4	0-5	95-100	80-95	75-90	50-85	<30	NP-7
	20-80	Gravelly loam, gravelly sandy clay loam, clay loam.	SC, CL, SM, ML	A-2, A-4, A-6	0-15	60-95	60-90	45-80	25-70	20-35	2-15
Bo---------------Bonnie	0-9	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	9-40	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	40-80	Silt loam, silty clay loam.	CL	A-4, A-6	0	100	100	90-100	80-100	25-39	8-15
Ca---------------Cotaco	0-17	Loam-------------	ML, CL-ML, SM, SC-SM	A-4	0-5	80-100	75-95	55-85	35-80	<30	NP-7
	17-60	Gravelly sandy clay loam, clay loam, loam.	SC, SM, GC, CL	A-2, A-4, A-6, A-1-b	0-10	60-100	50-95	40-90	20-80	<35	NP-15
	60-80	Gravelly silt loam, clay loam, loam.	SC, SM, GC, CL	A-2, A-4, A-6, A-1-b	0-10	60-100	50-95	40-90	20-80	<35	NP-15
CoB--------------Cottonbend	0-8	Loam-------------	ML, CL-ML, SM, SC-SM	A-4, A-2	0	80-100	80-100	65-100	30-75	<22	NP-6
	8-70	Loam, sandy clay loam, silty clay loam.	ML, CL-ML, SM, SC-SM	A-4, A-2	0-5	80-100	75-100	50-100	30-80	21-33	3-10
	70-90	Clay loam, loam, silty clay loam.	ML, CL, GC, SC	A-4, A-6, A-7, A-2	0-15	60-100	55-100	50-100	30-80	30-50	7-22
Cr*:											
Craigsville-----	0-8	Sandy loam-------	ML, SM, CL-ML, SC	A-2, A-4	0-10	90-100	80-100	40-75	25-60	0-25	NP-10
	8-26	Gravelly sandy loam, cobbly loam, very gravelly sandy loam.	SM, GM, GC, SC	A-1, A-2, A-4	25-60	50-80	30-65	25-60	15-40	0-25	NP-10
	26-80	Very gravelly loamy sand, very gravelly sandy loam, very cobbly loamy sand.	GC, GM, GP-GM, GM-GC	A-1, A-2	35-75	35-55	30-50	20-45	10-25	0-25	NP-8
Philo-----------	0-7	Fine sandy loam--	ML, CL-ML	A-4	0-5	95-100	80-100	75-90	60-80	20-35	1-10
	7-44	Fine sandy loam, sandy loam.	ML, SM, CL-ML	A-4	0-5	95-100	75-100	70-90	45-80	20-35	1-10
	44-80	Stratified sand to silt loam.	GM, SM, ML, CL-ML	A-2, A-4	0-5	60-95	50-90	40-85	30-80	15-30	1-10

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct						Pct
Dm*. Dumps, mine											
FbC*, FbF*:											
Fairpoint-------	0-11	Channery silty clay loam.	GC, SC, CL	A-6, A-7	5-20	65-90	55-80	45-80	35-75	35-50	12-24
	11-80	Channery clay loam, very shaly silty clay loam.	GC, SC, CL, CL-ML	A-4, A-6, A-7, A-2	15-30	55-75	25-65	20-65	15-60	25-50	4-24
Bethesda--------	0-8	Channery silt loam.	ML, GM, GM-GC, CL-ML	A-4, A-6	0-15	65-90	55-80	50-80	35-75	25-40	4-14
	8-80	Very channery clay loam, very channery silty clay loam, channery clay loam.	GM-GC, ML, CL, GM	A-4, A-6, A-7, A-2	10-30	45-80	25-65	25-65	20-60	24-50	3-23
GhF*:											
Gilpin----------	0-6	Loam-------------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-26	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-25	50-95	45-90	35-85	30-80	20-40	4-15
	26-30	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-25	25-55	20-50	15-45	15-40	20-40	4-15
	30	Weathered Bedrock	---	---	---	---	---	---	---	---	---
Highsplint------	0-8	Channery loam----	CL-ML, ML, GM-GC, SC-SM	A-2, A-4, A-6	5-25	45-80	40-70	35-65	30-60	15-35	3-15
	8-51	Very channery silt loam, very channery silty clay loam.	CL-ML, CL, GC, SC	A-4, A-6, A-7-6	5-25	45-75	40-70	40-70	35-65	25-45	5-20
	51-80	Very channery loam, very channery silty clay loam.	CL-ML, GM-GC, SC-SM, CL	A-2, A-4, A-6, A-7-6	5-25	45-75	40-70	40-70	30-65	20-45	5-20
GlC2*, GlD2*, GlE2*:											
Gilpin---------	0-6	Loam-------------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-26	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-25	50-95	45-90	35-85	30-80	20-40	4-15
	26-30	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-25	25-55	20-50	15-45	15-40	20-40	4-15
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct						Pct
GlC2*, GlD2*, GlE2*:											
Shelocta	0-10	Gravelly silt loam.	ML, GM, SM	A-4	0-10	55-95	50-80	40-70	36-65	<35	NP-10
	10-45	Silty clay loam, silt loam, channery silty clay loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	45-55	Weathered bedrock	---	---	---	---	---	---	---	---	---
GsF*:											
Gilpin	0-6	Loam	GC, CL, SC, CL-ML	A-2, A-4, A-6	0-5	80-95	75-90	75-85	65-80	20-40	4-15
	6-26	Channery silt loam, channery loam, silty clay loam.	GM-GC, CL, CL-ML, SC	A-2, A-4, A-5	0-25	50-95	45-90	35-85	30-80	20-40	4-15
	26-30	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-5	0-25	25-55	20-50	15-45	15-40	20-40	4-15
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
Shelocta	0-10	Gravelly silt loam.	ML, GM, SM	A-4	0-10	55-95	50-80	40-70	36-65	<35	NP-10
	10-45	Silty clay loam, silt loam, channery silty clay loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	45-55	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sequoia	0-2	Silt loam	CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	80-95	23-35	5-15
	2-23	Silty clay, clay, shaly silty clay.	CL, MH, CH	A-7	0	70-100	65-100	60-100	55-95	43-74	20-40
	23	Weathered bedrock	---	---	---	---	---	---	---	---	---
LoB, LoC2 Lonewood	0-8	Loam	ML, CL-ML, CL	A-4	0	100	90-100	85-100	75-90	18-26	3-9
	8-44	Silt loam, silty clay loam, loam.	CL	A-4, A-6	0	100	90-100	85-95	70-90	25-39	9-18
	44-50	Silty clay loam, clay loam, loam.	CL	A-6, A-7	0	95-100	85-100	75-90	65-85	29-48	10-23
	50-54	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ph, Pl Philo	0-7	Fine sandy loam	ML, SM, CL-ML	A-4	0-5	95-100	75-100	60-70	30-40	20-35	1-10
	7-26	Loam, fine sandy loam.	ML, SM, CL-ML	A-4	0-5	95-100	75-100	70-90	45-80	20-35	1-10
	26-80	Stratified sand to silt loam.	GM, SM, ML, CL-ML	A-2, A-4	0-5	60-95	50-90	40-85	30-80	15-30	1-10

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct						Pct
Po, Pp----------- Pope	0-11	Loam-------------	ML, CL, SM, CL-ML	A-4	0	90-100	80-100	70-100	45-90	<30	NP-10
	11-48	Fine sandy loam, sandy loam, loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	0	95-100	80-100	51-95	25-75	<30	NP-7
	48-67	Sandy loam, loamy sand.	SM, SC-SM, ML, GM	A-2, A-1, A-4	0-20	45-100	35-100	30-95	15-70	<30	NP-7
Pr--------------- Pope	0-11	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-2, A-4	0	85-100	75-100	51-85	25-55	<20	NP-5
	11-48	Fine sandy loam, sandy loam, loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	0	95-100	80-100	51-95	25-75	<30	NP-7
	48-67	Sandy loam, loamy sand.	SM, SC-SM, ML, GM	A-2, A-1, A-4	0-20	45-100	35-100	30-95	15-70	<30	NP-7
ShB, ShC--------- Shelocta	0-10	Gravelly silt loam.	ML, GM, SM	A-4	0-10	55-95	50-80	40-70	36-65	<35	NP-10
	10-45	Silty clay loam, silt loam, channery silty clay loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	45-55	Weathered bedrock	---	---	---	---	---	---	---	---	---
SkF*:											
Shelocta--------	0-10	Channery loam----	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	10-45	Silty clay loam, silt loam, channery silty clay loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	45-55	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cloverlick------	0-6	Channery loam----	CL, CL-ML, SC, SC-SM	A-4, A-6, A-7	5-10	55-90	50-85	40-80	35-70	25-45	5-20
	6-26	Very channery loam, extremely channery silt loam.	ML, CL-ML, SM, SC-SM	A-4, A-6, A-7	5-40	40-90	40-80	30-70	35-70	15-35	3-15
	26-63	Very gravelly loam, extremely channery silt loam, very flaggy loam.	ML, CL-ML, SM, SC-SM	A-2, A-4, A-6	5-40	40-80	40-80	30-70	30-70	15-35	3-15
	63-85	Very flaggy loam, extremely channery loam, extremely flaggy silt loam.	SM, SC-SM, GM, GM-GC	A-2, A-4, A-6	10-40	40-90	40-80	30-70	30-70	15-35	3-15

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct						Pct
SkF*:											
Kimper----------	0-7	Channery loam----	ML, CL-ML, GM, SM	A-2-4, A-1-b, A-4	5-10	35-90	30-75	25-65	20-65	22-30	4-10
	7-50	Channery loam, channery silt loam, very channery loam.	ML, CL-ML, GM, CL	A-2-4, A-4	0-10	55-95	40-75	40-80	30-65	27-41	6-18
	50-80	Channery clay loam, very channery silt loam, very channery sandy loam.	ML, CL-ML, GM, CL	A-2-4, A-1-b, A-4	5-20	40-85	35-75	30-70	20-65	23-30	3-10
SlF*:											
Shelocta--------	0-11	Channery loam----	ML, GM, SM	A-4	0-10	55-95	50-80	40-70	36-65	<35	NP-10
	11-48	Silty clay loam, silt loam, channery silty clay loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	45-55	Weathered bedrock	---	---	---	---	---	---	---	---	---
SlF*:											
Highsplint------	0-2	Channery loam----	CL-ML, ML, GM-GC, SC-SM	A-2, A-4, A-6	5-10	45-90	40-70	35-65	30-60	15-35	3-15
	2-51	Channery silt loam, channery loam, very flaggy loam.	CL-ML, CL, GC, SC	A-4, A-6, A-7-6	5-25	45-75	40-70	40-70	35-65	25-45	5-20
	51-80	Very channery loam, very channery silty clay loam.	CL-ML, GM-GC, SC-SM, CL	A-2, A-4, A-6, A-7-6	5-35	45-70	40-70	40-70	30-65	20-45	5-20
Sn-------------- Stendal	0-10	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-38	5-15
	10-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7-6	0	100	100	90-100	85-98	25-50	5-25
St-------------- Stokly	0-8	Fine sandy loam--	CL, ML, CL-ML, SM	A-4	0	85-100	80-100	65-90	35-65	<30	NP-10
	8-80	Loam, sandy loam, gravelly sandy loam, gravelly loam, loamy sand.	SM, SC, GM, GC	A-1-b, A-2-4, A-4	0	65-100	60-100	45-70	15-45	<30	NP-10
Ud*, UrC*, UrE*: Udorthents.											
Urban land.											

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct						Pct
W*. Water											
Ye---------------- Yeager	0-13	Fine sandy loam	SM, SC-SM	A-2-4, A-4	0	95-100	95-100	60-90	20-45	<25	NP-5
	13-80	Sand, fine sandy loam, loamy fine sand, gravelly loamy sand.	SP-SM, SM	A-2-4, A-1, A-3	0-5	85-100	40-100	40-80	5-35	<20	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 15.--Physical and Chemical Properties of the Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Ag, AlB, AlC----- Allegheny	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.22	3.6-5.5	Low----------	0.32	5	1-4
	8-56	18-35	1.20-1.50	0.6-2.0	0.13-0.18	3.6-5.5	Low----------	0.28		
	56-80	10-35	1.20-1.40	0.6-2.0	0.08-0.17	3.6-5.5	Low----------	0.28		
BaB-------------- Barbourville	0-20	10-27	1.20-1.40	2.0-6.0	0.10-0.18	4.5-7.3	Low----------	0.28	4	2-15
	20-80	10-30	1.40-1.60	2.0-6.0	0.10-0.18	4.5-6.0	Low----------	0.17		
Bo--------------- Bonnie	0-9	18-27	1.30-1.50	0.6-2.0	0.22-0.25	4.5-7.3	Low----------	0.43	5	1-3
	9-40	18-27	1.35-1.55	0.2-0.6	0.21-0.24	4.5-5.5	Low----------	0.43		
	40-80	18-30	1.35-1.55	0.2-0.6	0.14-0.24	4.5-7.8	Low----------	0.43		
Ca--------------- Cotaco	0-17	7-27	1.20-1.40	0.6-6.0	0.12-0.20	3.6-5.5	Low----------	0.37	3	.5-4
	17-60	18-35	1.20-1.50	0.6-2.0	0.07-0.15	3.6-5.5	Low----------	0.28		
	60-80	18-35	1.20-1.50	0.6-2.0	0.07-0.15	3.6-5.5	Low----------	0.28		
CoB-------------- Cottonbend	0-8	10-25	1.35-1.50	0.6-2.0	0.15-0.20	5.6-7.3	Low----------	0.32	5	.5-2
	8-70	18-35	1.40-1.55	0.6-2.0	0.13-0.20	4.5-6.0	Low----------	0.32		
	70-90	15-50	1.40-1.60	0.6-2.0	0.10-0.18	4.5-5.5	Low----------	0.32		
Cr*:										
Craigsville-----	0-8	5-15	1.20-1.40	2.0-20	0.07-0.15	4.5-5.5	Low----------	0.17	3	1-5
	8-26	5-15	1.30-1.60	2.0-20	0.06-0.15	4.5-5.5	Low----------	0.17		
	26-80	5-10	1.35-1.55	6.0-20	0.04-0.09	4.5-5.5	Low----------	0.17		
Philo-----------	0-7	10-18	1.20-1.40	0.6-2.0	0.14-0.20	4.5-6.0	Low----------	0.28	5	2-4
	7-44	10-18	1.20-1.40	0.6-2.0	0.10-0.20	4.5-6.0	Low----------	0.32		
	44-80	5-18	1.20-1.40	2.0-6.0	0.06-0.10	4.5-6.0	Low----------	0.24		
Dm*. Dumps, mine										
FbC*, FbF*:										
Fairpoint-------	0-11	27-35	1.45-1.65	0.2-0.6	0.06-0.15	5.6-7.3	Moderate-----	0.28	5	0-.5
	11-80	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.6-7.3	Moderate-----	0.28		
Bethesda--------	0-8	18-27	1.40-1.55	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.28	5	0-.5
	8-80	18-35	1.60-1.90	0.2-0.6	0.04-0.10	3.6-5.5	Low----------	0.32		
GhF*:										
Gilpin----------	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3-2	.5-4
	6-26	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	26-30	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	30	---	---	---	---	---	-------------	----		
Highsplint------	0-8	15-27	1.10-1.30	0.6-6.0	0.07-0.15	3.6-6.5	Low----------	0.17	3	.5-5
	8-51	18-34	1.30-1.55	0.6-6.0	0.07-0.13	3.6-5.5	Low----------	0.17		
	51-80	18-34	1.55-1.70	0.6-2.0	0.05-0.11	3.6-5.5	Low----------	0.17		
GlC2*, GlD2*, GlE2*:										
Gilpin---------	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3-2	.5-4
	6-26	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	26-30	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	30	---	---	---	---	---	-------------	----		

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
GlC2*, GlD2*, GlE2*:										
Shelocta-------	0-10	10-25	1.15-1.30	0.6-2.0	0.10-0.18	4.5-5.5	Low----------	0.28	3	.5-5
	10-45	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.28		
	45-48	---	---	---	---	---	-------------	----		
GsF*:										
Gilpin----------	0-6	15-27	1.20-1.40	0.6-2.0	0.08-0.14	3.6-5.5	Low----------	0.24	3	---
	6-26	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	26-30	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	30	---	---	---	---	---	-------------	----		
Shelocta--------	0-10	10-25	1.15-1.30	0.6-2.0	0.10-0.18	4.5-5.5	Low----------	0.28	3	.5-5
	10-45	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.28		
	45-48	---	---	---	---	---	-------------	----		
Sequoia---------	0-2	15-27	1.30-1.50	0.6-2.0	0.17-0.20	4.5-5.5	Low----------	0.37	3-2	.5-2
	2-23	35-60	1.35-1.55	0.2-0.6	0.08-0.16	4.5-5.5	Moderate-----	0.24		
	23	---	---	---	---	---	-------------	----		
LoB, LoC2-------- Lonewood	0-8	15-25	1.30-1.40	0.6-2.0	0.18-0.20	4.5-5.5	Low----------	0.37	3	1-3
	8-44	20-39	1.30-1.45	0.6-2.0	0.16-0.18	4.5-5.5	Low----------	0.37		
	44-50	25-45	1.40-1.55	0.6-2.0	0.14-0.17	4.5-5.5	Low----------	0.32		
	50-54	---	---	---	---	---	-------------	----		
Ph, Pl----------- Philo	0-7	10-18	1.20-1.40	2.0-6.0	0.10-0.14	4.5-6.0	Low----------	0.28	5	2-4
	7-26	10-18	1.20-1.40	0.6-2.0	0.10-0.20	4.5-6.0	Low----------	0.32		
	26-80	5-18	1.20-1.40	2.0-6.0	0.06-0.10	4.5-6.0	Low----------	0.24		
Po, Pp----------- Pope	0-11	5-15	1.20-1.40	0.6-2.0	0.14-0.23	3.6-5.5	Low----------	0.37	5	1-4
	11-48	5-18	1.30-1.60	0.6-6.0	0.10-0.18	3.6-5.5	Low----------	0.28		
	48-67	5-20	1.30-1.60	0.6-6.0	0.10-0.18	3.6-5.5	Low----------	0.28		
Pr--------------- Pope	0-11	5-15	1.20-1.40	2.0-6.0	0.10-0.16	3.6-5.5	Low----------	0.37	5	1-4
	11-48	5-18	1.30-1.60	0.6-6.0	0.10-0.18	3.6-5.5	Low----------	0.28		
	48-67	5-20	1.30-1.60	0.6-6.0	0.10-0.18	3.6-5.5	Low----------	0.28		
ShB, ShC--------- Shelocta	0-10	10-25	1.15-1.30	0.6-2.0	0.10-0.18	4.5-5.5	Low----------	0.28	3	.5-5
	10-45	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.28		
	45-48	---	---	---	---	---	-------------	----		
SkF*:										
Shelocta--------	0-10	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-5.5	Low----------	0.32	3	.5-5
	10-45	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.28		
	45-48	---	---	---	---	---	-------------	----		
Cloverlick------	0-6	18-34	1.00-1.20	0.6-6.0	0.20-0.24	3.6-6.0	Low----------	0.10	3	5-15
	6-26	15-30	1.10-1.30	0.6-6.0	0.18-0.24	3.6-5.5	Low----------	0.10		
	26-63	15-30	1.30-1.50	0.6-6.0	0.12-0.20	3.6-5.5	Low----------	0.10		
	63-85	15-30	1.30-1.60	0.6-6.0	0.05-0.12	3.6-5.5	Low----------	0.10		
Kimper----------	0-7	12-27	1.00-1.40	0.6-6.0	0.13-0.20	4.1-7.3	Low----------	0.15	3	2-15
	7-50	18-30	1.20-1.70	0.6-2.0	0.13-0.20	4.5-6.0	Low----------	0.17		
	50-80	12-30	1.20-1.70	0.6-2.0	0.10-0.16	4.5-6.0	Low----------	0.17		

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
SlF*:										
Shelocta--------	0-10	10-25	1.15-1.30	0.6-2.0	0.10-0.18	4.5-5.5	Low----------	0.28	3	.5-5
	10-45	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.28		
	45-48	---	---	---	---	---	-------------	----		
Highsplint------	0-2	15-27	1.10-1.30	0.6-6.0	0.07-0.15	3.6-6.5	Low----------	0.17	3	.5-5
	2-51	18-34	1.30-1.55	0.6-6.0	0.07-0.13	3.6-5.5	Low----------	0.17		
	51-80	18-34	1.55-1.70	0.6-2.0	0.05-0.11	3.6-5.5	Low----------	0.17		
Sn--------------- Stendal	0-10	12-26	1.30-1.55	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	5	1-3
	10-60	18-34	1.35-1.55	0.6-2.0	0.20-0.22	4.5-5.5	Low----------	0.55		
St--------------- Stokly	0-8	7-18	1.30-1.65	2.0-6.0	0.10-0.18	3.6-7.3	Low----------	0.28	5	1-4
	8-80	7-18	1.35-1.65	2.0-6.0	0.08-0.18	3.6-5.5	Low----------	0.17		
Ud*, UrC*, UrE*: Udorthents.										
Urban land.										
W*. Water										
Ye--------------- Yeager	0-13	3-12	1.40-1.60	2.0-6.0	0.08-0.14	4.5-7.3	Low----------	0.28	5	1-2
	13-80	2-18	1.40-1.70	2.0-20	0.05-0.10	4.5-7.3	Low----------	0.15		

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 16.--Soil and Water Features

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
Ag---------------- Allegheny	B	Rare---------	Brief-----	Jan-May	>3.5	Apparent	Dec-Apr	>60	---	Low------	High.
AlB, AlC---------- Allegheny	B	None---------	---	---	>3.5	---	---	>60	---	Low------	High.
BaB--------------- Barbourville	B	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
Bo---------------- Bonnie	C/D	Occasional	Brief-----	Jan-May	0-1.0	Apparent	Jan-Jun	>60	---	High-----	High.
Ca---------------- Cotaco	C	Rare---------	Brief-----	Jan-May	1.5-2.5	Apparent	Nov-May	>60	---	Moderate	High.
CoB--------------- Cottonbend	B	None---------	---	---	>6.0	---	---	>72	---	Moderate	High.
Cr*: Craigsville------	B	Rare---------	Brief-----	Jan-May	>6.0	---	---	>60	---	Low------	Moderate.
Philo------------	B	Rare---------	Brief-----	Dec-May	1.5-3.0	Apparent	Dec-Apr	>60	---	Low------	High.
Dm*. Dumps, mine											
FbC*, FbF*: Fairpoint--------	C	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Bethesda---------	C	None---------	---	---	>6.0	---	---	>60	---	Moderate	High.
GhF*: Gilpin-----------	C	None---------	---	---	>6.0	---	---	20-40	Soft	Low------	High.
Highsplint-------	B	None---------	---	---	>6.0	---	---	>60	---	Low------	High.
GlC2*, GlD2*, GlE2*: Gilpin----------	C	None---------	---	---	>6.0	---	---	20-40	Soft	Low------	High.
Shelocta--------	B	None---------	---	---	>4.0	---	---	40-60	Soft	Low------	High.
GsF*: Gilpin-----------	C	None---------	---	---	>6.0	---	---	20-40	Soft	Low------	High.
Shelocta---------	B	None---------	---	---	>4.0	Apparent	Dec-Apr	40-60	Soft	Low------	High.
Sequoia----------	C	None---------	---	---	>6.0	---	---	20-40	Soft	High-----	Moderate.
LoB, LoC2--------- Lonewood	B	None---------	---	---	>6.0	---	---	40-60	Hard	Low------	Moderate.
Ph---------------- Philo	B	Rare---------	Brief-----	Dec-May	1.5-3.0	Apparent	Dec-Apr	>60	---	Low------	High.
Pl---------------- Philo	B	Occasional	Brief-----	Dec-May	1.5-3.0	Apparent	Dec-Apr	>60	---	Low------	High.

See footnote at end of table.

Table 16.--Soil and Water Features--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In			
Po------------------ Pope	B	Rare---------	Brief-----	Jan-May	>6.0	---	---	>60	---	Low------	High.
Pp, Pr------------ Pope	B	Occasional	Brief-----	Dec-Apr	>6.0	---	---	>60	---	Low------	High.
ShB, ShC---------- Shelocta	B	None---------	---	---	>4.0	Apparent	Dec-Apr	40-60	Soft	Low------	High.
SkF*:											
Shelocta---------	B	None---------	---	---	>4.0	Apparent	Dec-Apr	40-60	Soft	Low------	High.
Cloverlick-------	B	None---------	---	---	>6.0	---	---	>60	---	Low------	High.
Kimper-----------	B	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
SlF*:											
Shelocta---------	B	None---------	---	---	>4.0	Apparent	Dec-Apr	40-60	Soft	Low------	High.
Highsplint-------	B	None---------	---	---	>6.0	---	---	>60	---	Low------	High.
Sn---------------- Stendal	C	Occasional	Brief-----	Jan-May	0.5-1.5	Apparent	Jan-Apr	>60	---	High-----	High.
St---------------- Stokly	B	Occasional	Brief-----	Dec-May	0.5-1.0	Apparent	Dec-May	>60	---	Moderate	High.
Ud*, UrC*, UrE*: Udorthents.											
Urban land.											
W*. Water											
Ye---------------- Yeager	A	Occasional	Brief-----	Dec-May	---	---	---	---	---	Low------	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 17.--Composition of Statistical Variability of Selected Map Units

(SD means standard deviation; SE, standard error of the mean; CI, confidence interval; and p, level of probability. See text for calculation method used and examples of statements for expressing map unit variability)

Map symbol, number of statistical samples (n) and total observations, and soil names	Number of observations	Statistical measures of variability--				
		Mean	SD	SE	CI (p=0.80)	CI (p=0.90)
		Pct	Pct	Pct	Pct	Pct
Cr:						
n=5; total observations=39						
Craigsville and similar soils-----	21	53.8	13.7	6.1	44-63	41-67
Philo and similar soils-----------	11	28.2	10.1	4.5	21-35	19-38
Contrasting inclusions------------	7	17.9	8.9	4.0	12-24	9-26
GsF:						
n=9; total observations=119						
Gilpin and similar soils----------	25	21.0	14.1	4.7	14-28	12-30
Shelocta and similar soils--------	26	21.8	9.8	3.3	17-26	16-28
Sequoia and similar soils---------	18	15.1	11.1	3.7	10-20	8-22
Contrasting inclusions------------	50	42.0	13.7	4.6	36-48	34-50
SkF:						
n=9; total observations=100						
Shelocta and similar soils--------	24	24.0	5.8	1.9	21-27	20-28
Cloverlick and similar soils------	24	24.0	8.1	2.7	20-28	19-29
Kimper and similar soils----------	22	22.0	10.8	3.6	17-27	15-29
Contrasting inclusions------------	30	30.0	11.5	3.8	25-35	23-37
SlF:						
n=7; total observations=87						
Shelocta and similar soils--------	51	58.6	11.2	4.2	53-65	50-67
Highsplint and similar soils------	17	19.5	8.4	3.2	15-24	13-26
Contrasting inclusions------------	19	21.8	8.6	3.2	17-27	16-28

Table 18.--Classification of the Soils

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Allegheny	Fine-loamy, mixed, mesic Typic Hapludults
Barbourville	Fine-loamy, mixed, mesic Typic Haplumbrepts
Bethesda	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Bonnie	Fine-silty, mixed, acid, mesic Typic Fluvaquents
Cloverlick	Loamy-skeletal, mixed, mesic Umbric Dystrochrepts
Cotaco	Fine-loamy, mixed, mesic Aquic Hapludults
Cottonbend	Fine-loamy, siliceous, mesic Typic Paleudults
Craigsville	Loamy-skeletal, mixed, mesic Fluventic Dystrochrepts
Fairpoint	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Highsplint	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Kimper	Fine-loamy, mixed, mesic Umbric Dystrochrepts
Lonewood	Fine-loamy, siliceous, mesic Typic Hapludults
Philo	Coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts
Pope	Coarse-loamy, mixed, mesic Fluventic Dystrochrepts
Sequoia	Clayey, mixed, mesic Typic Hapludults
Shelocta	Fine-loamy, mixed, mesic Typic Hapludults
Stendal	Fine-silty, mixed, acid, mesic Aeric Fluvaquents
Stokly	Coarse-loamy, mixed, acid, mesic Aeric Fluvaquents
Yeager	Sandy, mixed, mesic Typic Udifluvents

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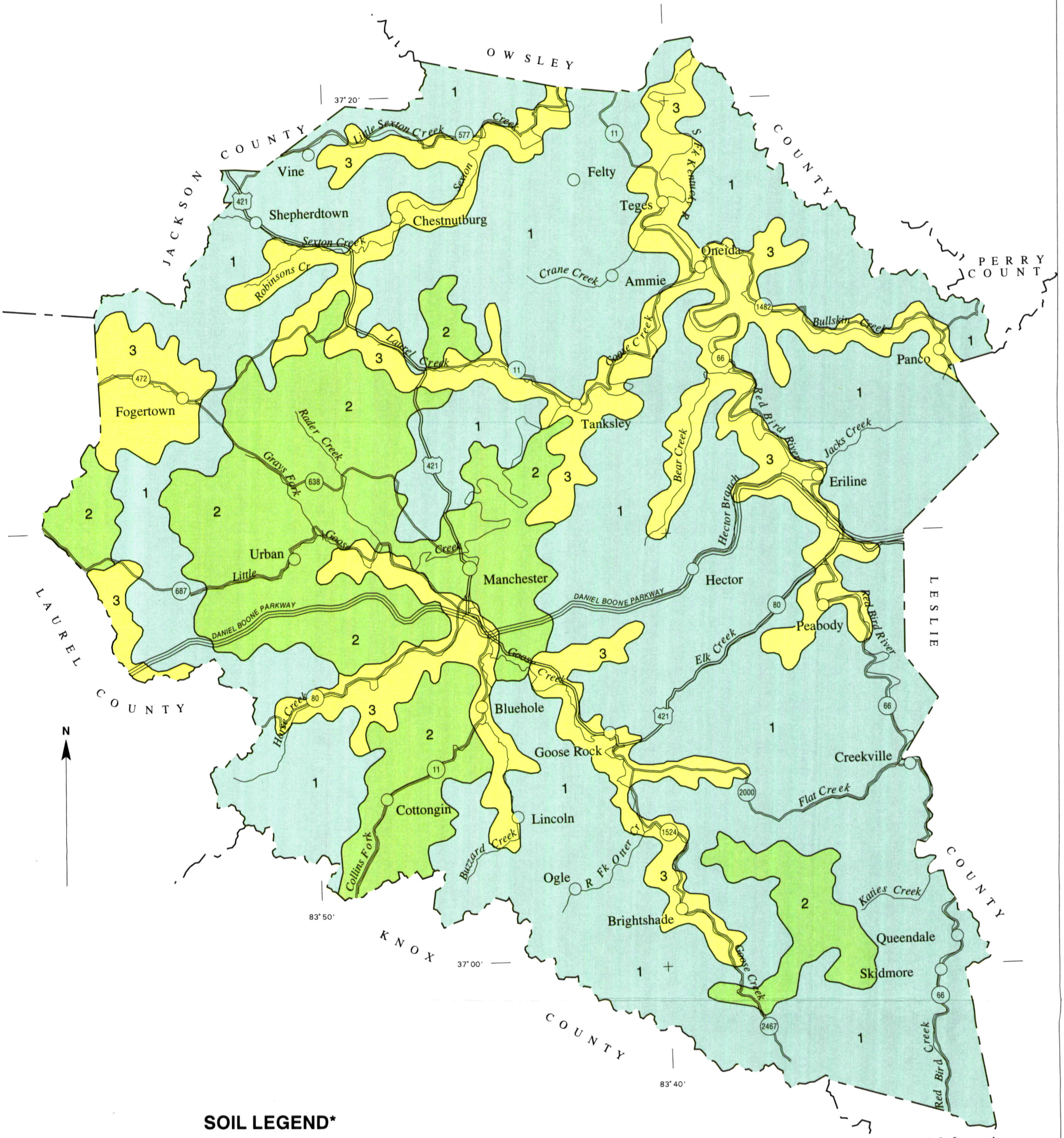


SOIL LEGEND*

SHELOCTA-CLOVERLICK-HIGHSPLINT

1 — Steep and very steep, deep and very deep, well drained soils; on ridgetops, side slopes and footslopes of hills and mountains

SHELOCTA-FAIRPOINT-BETHESDA-GILPIN

2 — Gently sloping to very steep, very deep to moderately deep, well drained soils; on side slopes and ridgetops of hills and on areas surface mined for coal

POPE-SHELOCTA-GILPIN

3 — Nearly level to steep, very deep to moderately deep, well drained soils; on flood plains and on side slopes, ridgetops and footslopes of hills

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1994

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
KENTUCKY NATURAL RESOURCES
AND ENVIRONMENTAL PROTECTION CABINET
KENTUCKY AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

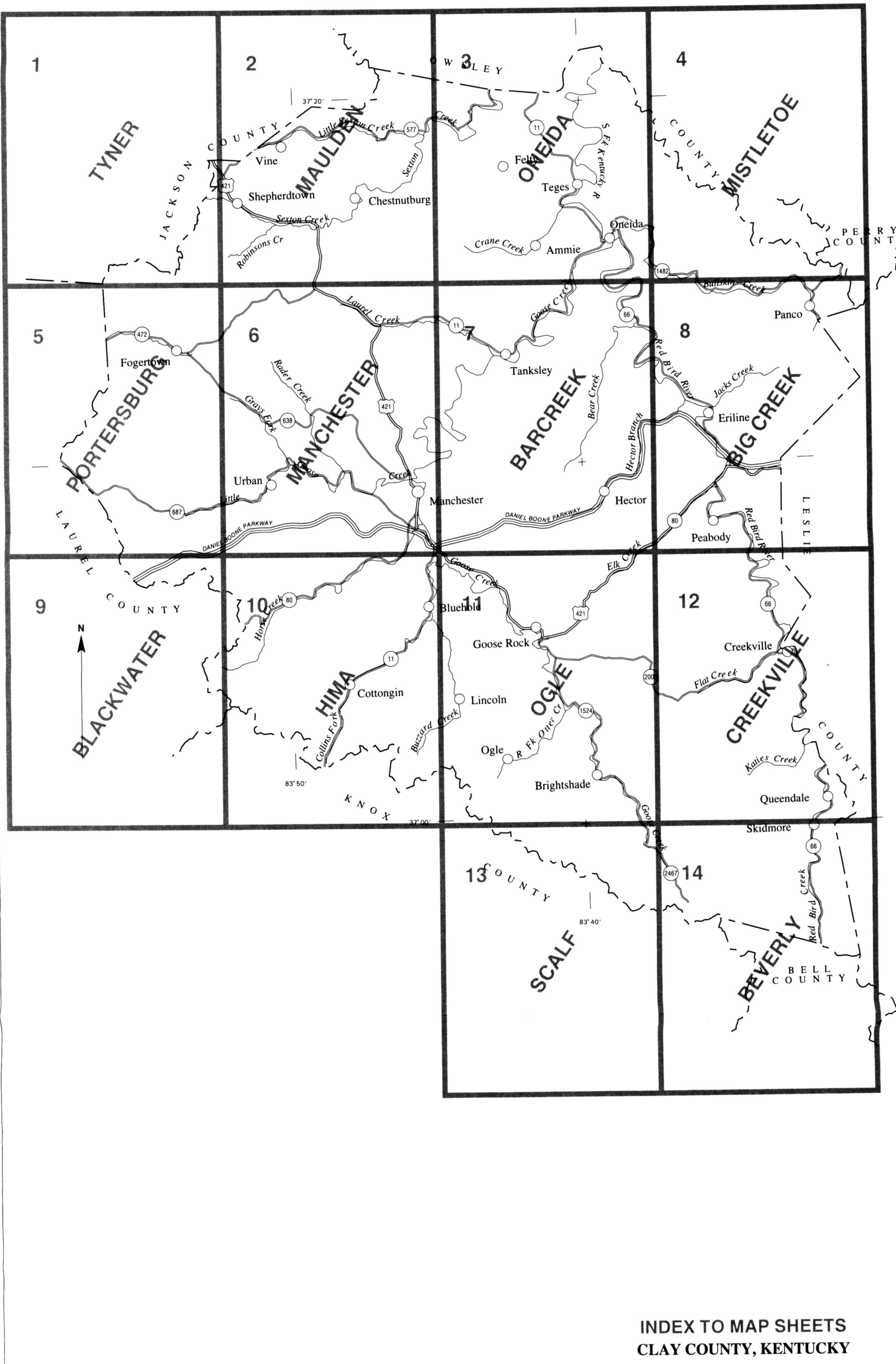
CLAY COUNTY, KENTUCKY

Scale 1:190080

1 0 1 2 3
MILES

1 0 1 2 3 4 5 6
KILOMETERS

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS
CLAY COUNTY, KENTUCKY

Scale 1:190080

MILES

KILOMETERS

SOIL LEGEND

Map symbols consist of a combination of letters or of letters and a number. The first two letters represent the kind of soil. A capital letter following these letters indicates the class of slope. Symbols without a slope letter are for nearly level soils or for miscellaneous areas. A final number of 2 indicates that the soil is eroded.

SYMBOL	NAME
Ag	Allegheny loam, rarely flooded
AlB	Allegheny loam, 2 to 6 percent slopes
AlC	Allegheny loam, 6 to 12 percent slopes
BaB	Barbourville loam, 2 to 8 percent slopes
Bo	Bonnie silt loam, occasionally flooded
Ca	Cotaco loam, rarely flooded
CoB	Cottonbend loam, 2 to 6 percent slopes
Cr	Craigsville-Philo complex, 0 to 3 percent slopes, rarely flooded
DAM	Dam
Dm	Dumps, mine; tailings; and tipples
FbC	Fairpoint and Bethesda soils, 2 to 20 percent slopes
FbF	Fairpoint and Bethesda soils, 20 to 70 percent slopes
GhF	Gilpin-Highsplint complex, rocky, 60 to 100 percent slopes
GlC2	Gilpin-Shelocta complex, 3 to 12 percent slopes, eroded
GlD2	Gilpin-Shelocta complex, 12 to 20 percent slopes, eroded
GlE2	Gilpin-Shelocta complex, 20 to 35 percent slopes, eroded
GsF	Gilpin-Shelocta-Sequoia complex, 25 to 55 percent slopes, very stony
LoB	Lonewood loam, 2 to 6 percent slopes
LoC2	Lonewood loam, 6 to 12 percent slopes, eroded
Ph	Philo fine sandy loam, rarely flooded
Pl	Philo fine sandy loam, occasionally flooded
Po	Pope loam, rarely flooded
Pp	Pope loam, occasionally flooded
Pr	Pope fine sandy loam, occasionally flooded
ShB	Shelocta gravelly silt loam, 2 to 6 percent slopes
ShC	Shelocta gravelly silt loam, 6 to 12 percent slopes
SkF	Shelocta-Cloverlick-Kimper complex, 35 to 75 percent slopes, very stony
SlF	Shelocta-Highsplint complex, 35 to 75 percent slopes, very stony
Sn	Stendal silt loam, occasionally flooded
St	Stokly fine sandy loam, occassionally flooded
Ud	Udorthents-Urban land complex, rarely flooded
UrC	Udorthents-Urban land complex, 3 to 15 percent slopes
UrE	Udorthents-Urban land complex, 15 to 35 percent slopes
W	Water
Ye	Yeager fine sandy loam, occasionally flooded

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- County or parish
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Cemetery

ROAD EMBLEM & DESIGNATIONS

- Interstate 173
- Federal 287
- State 52

DAMS

- Medium or Small (Named where applicable) W

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

MISCELLANEOUS WATER FEATURES

- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS GlD2 GsF

SHORT STEEP SLOPE

MISCELLANEOUS

- Gravelly spot
- Sandy spot
- Alluvial Fan (2 to 5 acres)

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, KENTUCKY
TYNER QUADRANGLE
SHEET NUMBER 1 OF 14

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1983 and 1984 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey data; therefore, some features may not align exactly with base imagery.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

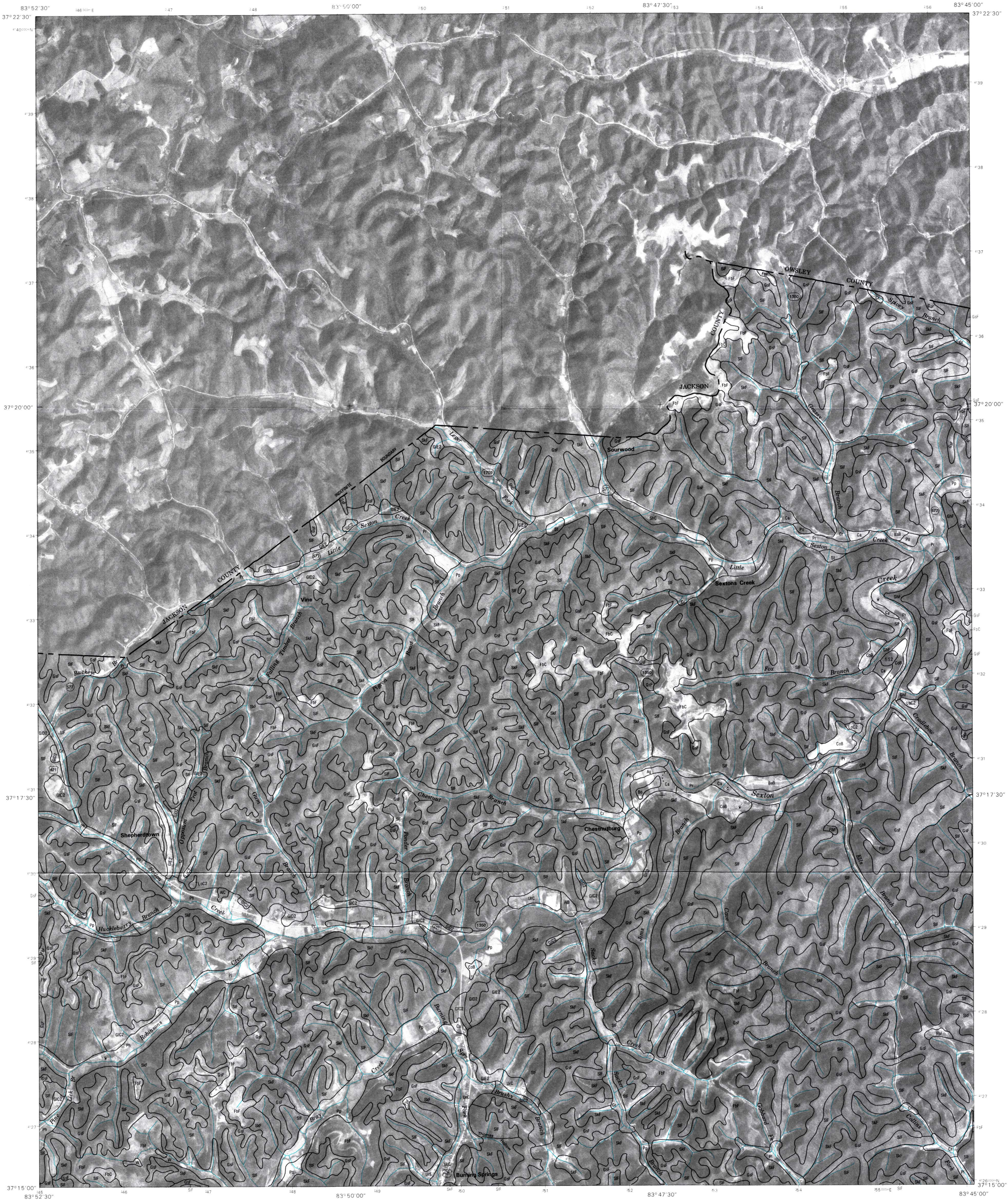
1 0 1
KILOMETERS

QUADRANGLE LOCATION

1	2	3	1 SANDGAP 2 MCKEE 3 STURGEON
4		5	4 PARROT 5 MAULDEN
6	7	8	6 LONDON 7 PORTERSBURG 8 MANCHESTER

INDEX TO ADJOINING 7.5 MAPS

TYNER, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 1 OF 14



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NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 MCKEE
2 STURGEON
3 BOONEVILLE
4 TYNER
5 ONEIDA
6 PORTERSBURG
7 MANCHESTER
8 BARCREEK

INDEX TO ADJOINING 7.5 MAPS

MAULDEN, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 2 OF 14

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

ONEIDA, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 3 OF 14

1	2	3
4		5
6	7	8

1 STURGEON
2 BOONEVILLE
3 COWCREEK
4 MAULDEN
5 MISTLETOE
6 MANCHESTER
7 BARCREEK
8 BIG CREEK

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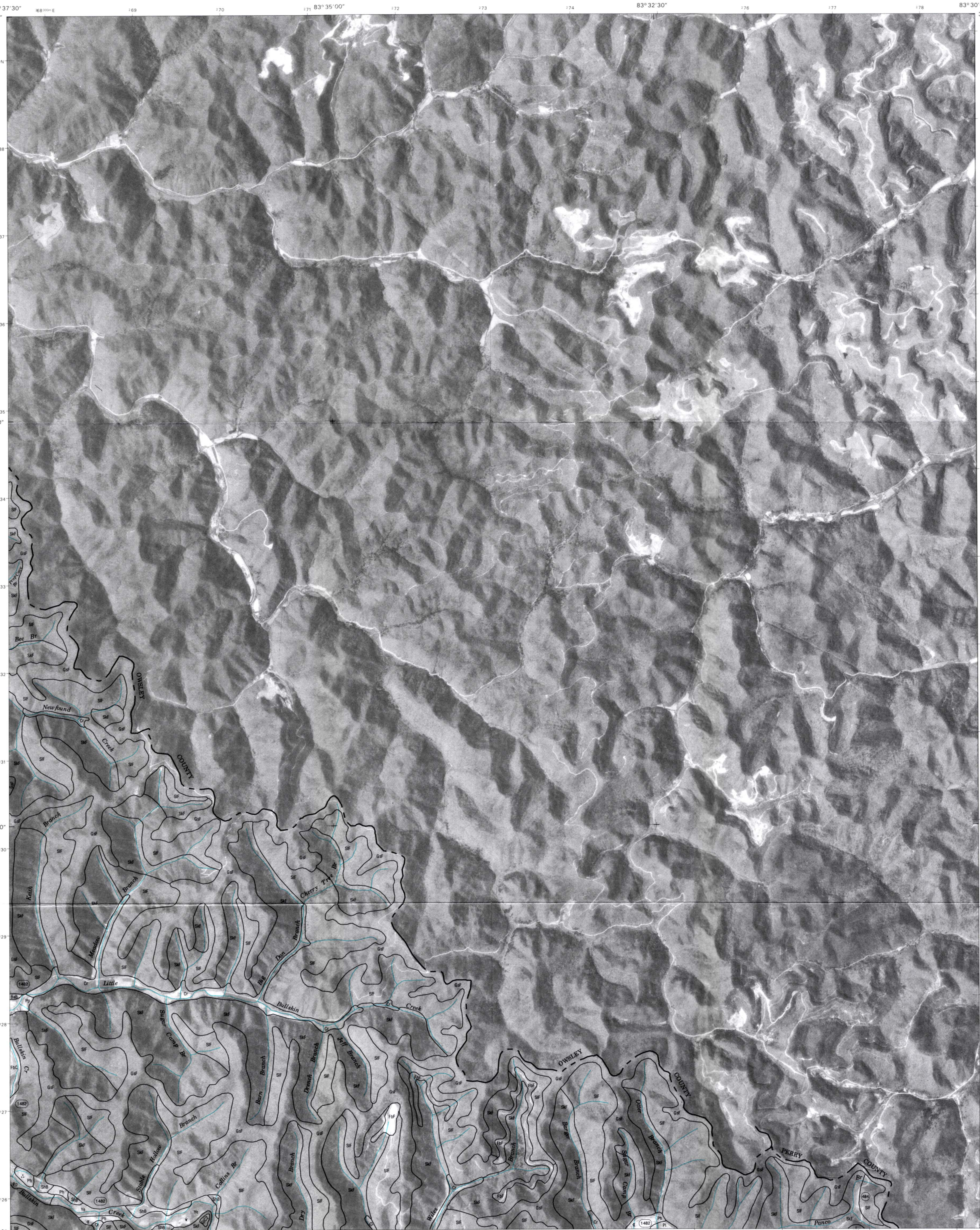
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, KENTUCKY
MISTLETOE QUADRANGLE
SHEET NUMBER 4 OF 14



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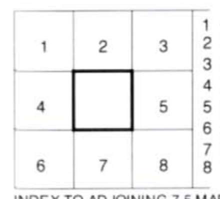
NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS



QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 BOONEVILLE
2 COWCREEK
3 CANOE
4 ONEIDA
5 BUCKHORN
6 BARCREEK
7 BIG CREEK
8 HYDEN WEST

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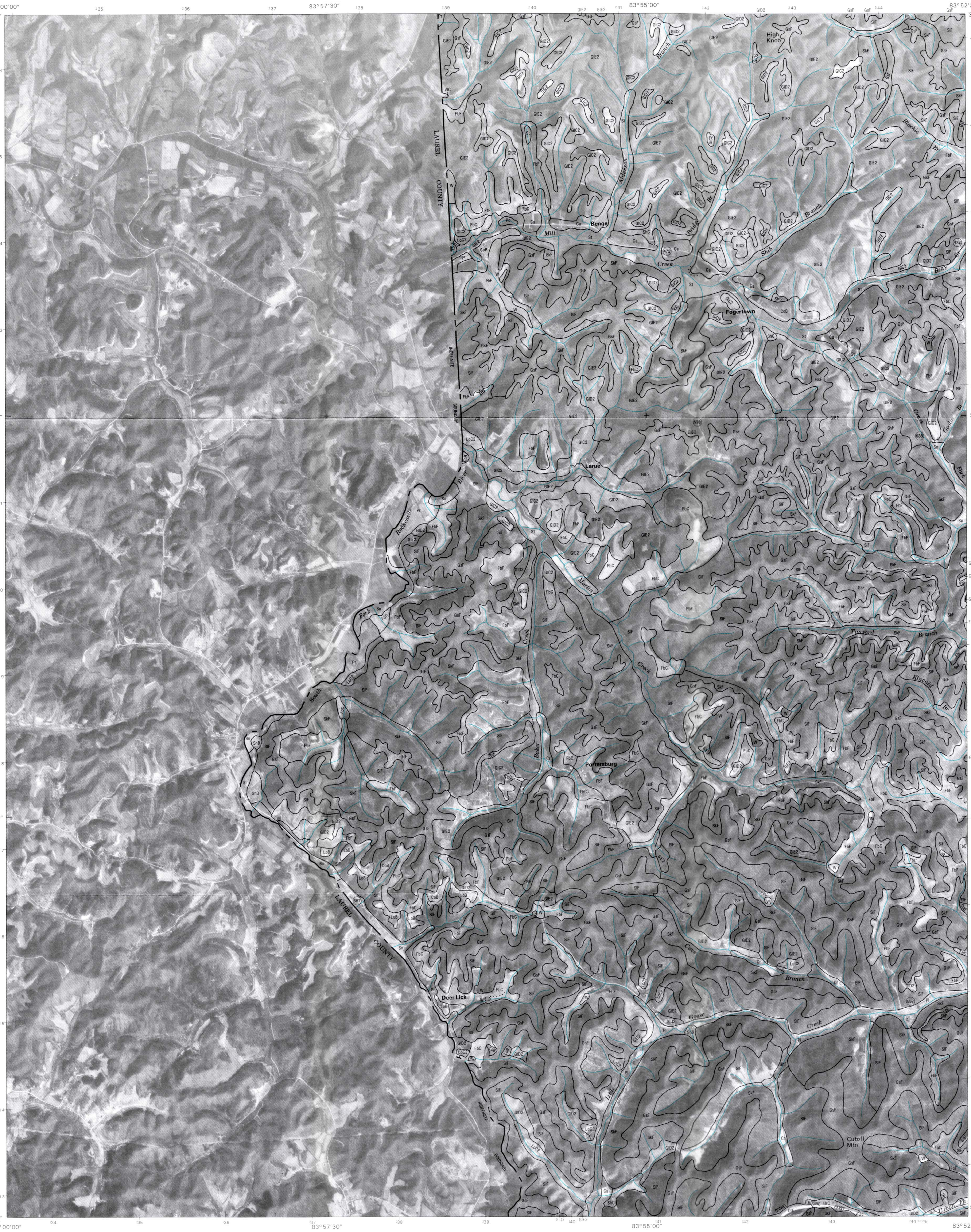
MISTLETOE, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 4 OF 14



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NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

1	2	3	1 PARROT 2 TYNER 3 MAULDEN
4		5	4 LONDON 5 MANCHESTER
6	7	8	6 LILY 7 BLACKWATER 8 HIMA

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PORTERSBURG, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 5 OF 14

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, KENTUCKY
MANCHESTER QUADRANGLE
SHEET NUMBER 6 OF 14

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NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

MANCHESTER, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 6 OF 14

1 TYNER
2 MAULDEN
3 ONEIDA
4 PORTERSBURG
5 BARCREEK
6 BLACKWATER
7 HIMA
8 OGLE

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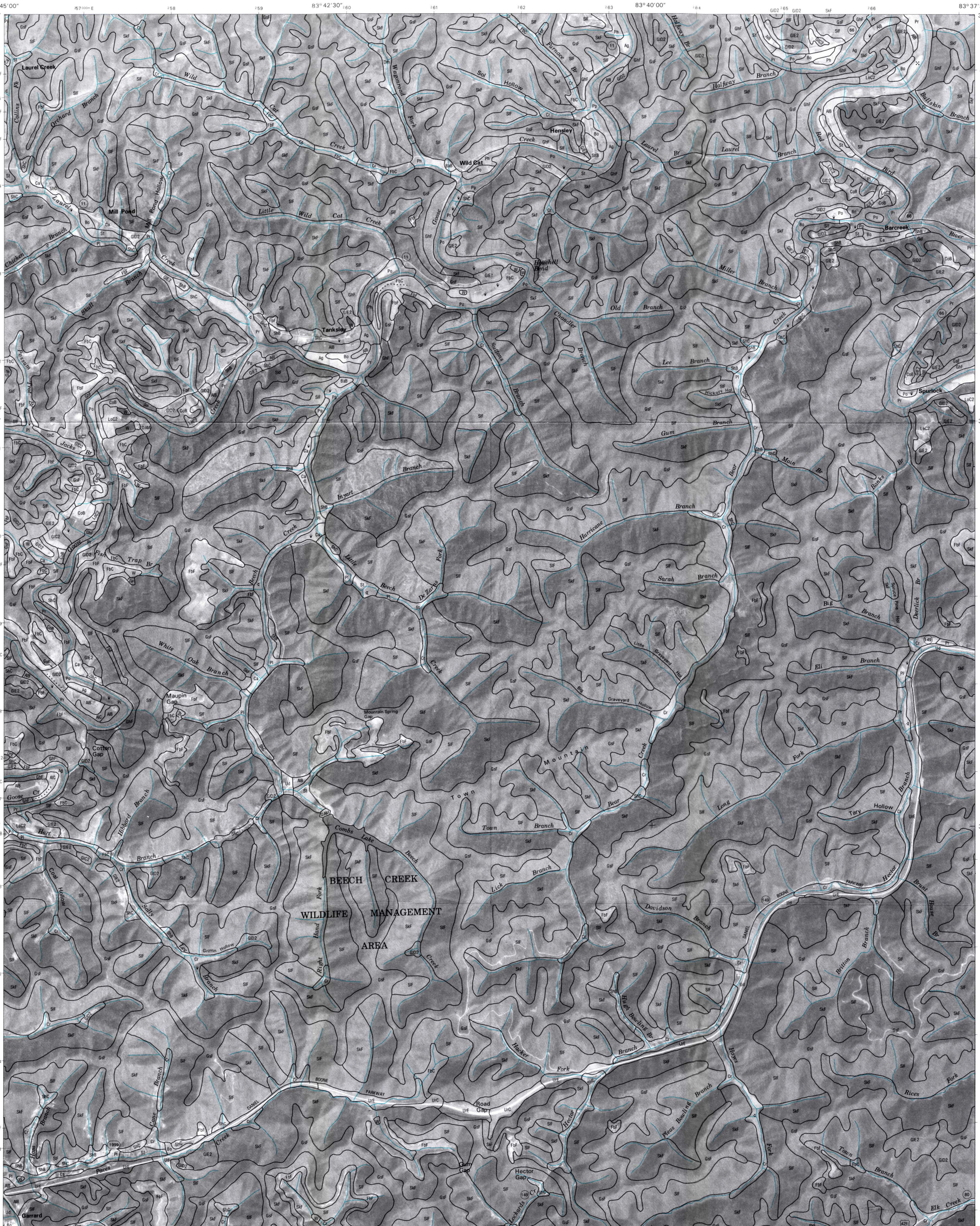
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, KENTUCKY
BARCREEK QUADRANGLE
SHEET NUMBER 7 OF 14



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NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

CLAY COUNTY, KENTUCKY NO. 7

QUADRANGLE LOCATION

BARCREEK, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 7 OF 14

1 MAULDEN
2 ONEIDA
3 MISTLETOE
4 MANCHESTER
5 BIG CREEK
6 HIMA
7 OGLE
8 CREEKVILLE

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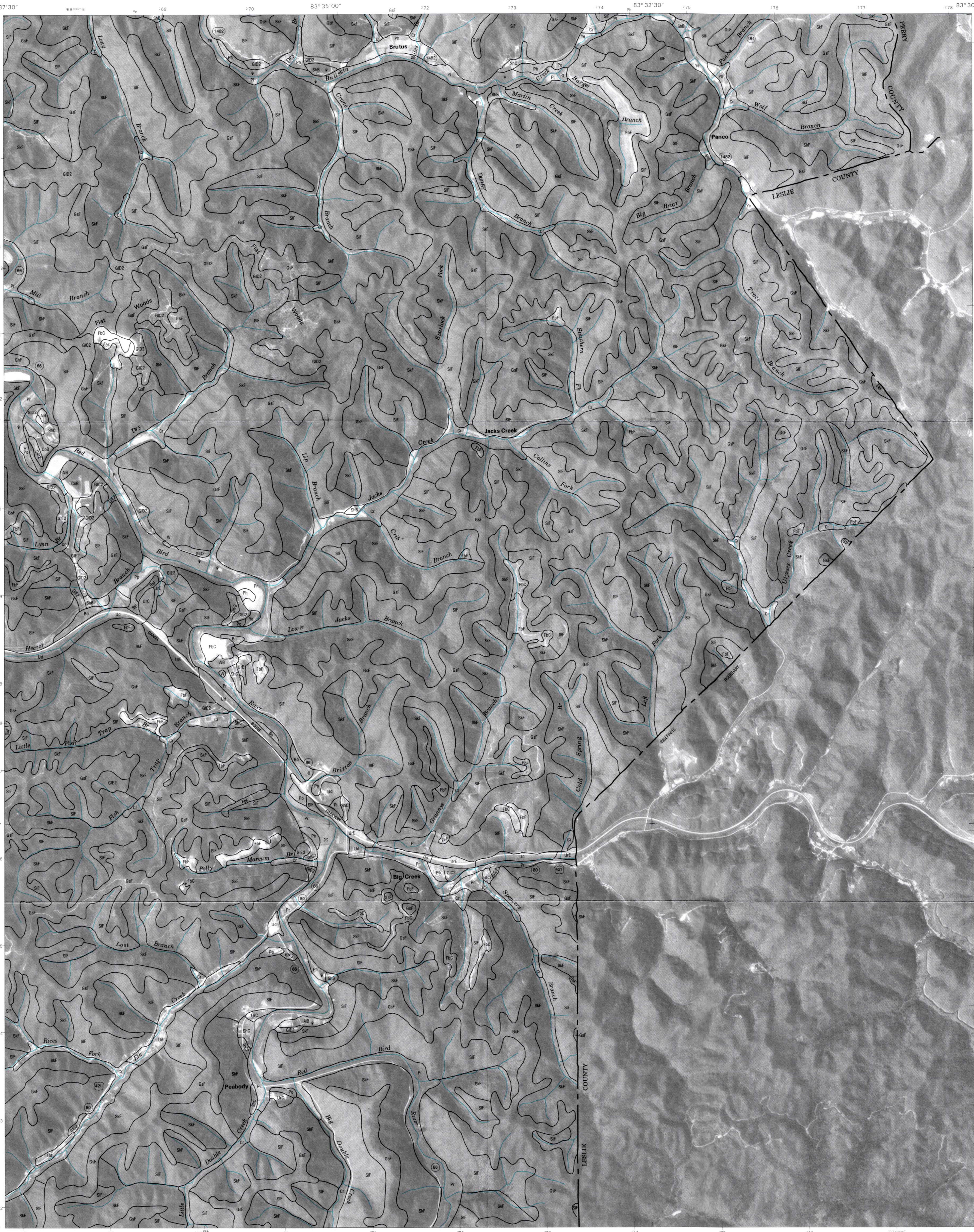
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, KENTUCKY
BIG CREEK QUADRANGLE
SHEET NUMBER 8 OF 14



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NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 ONEIDA
2 MISTLETOE
3 BUCKHORN
4 BARCREEK
5 HYDEN WEST
6 OGLE
7 CREEKVILLE
8 HOSKINSTON

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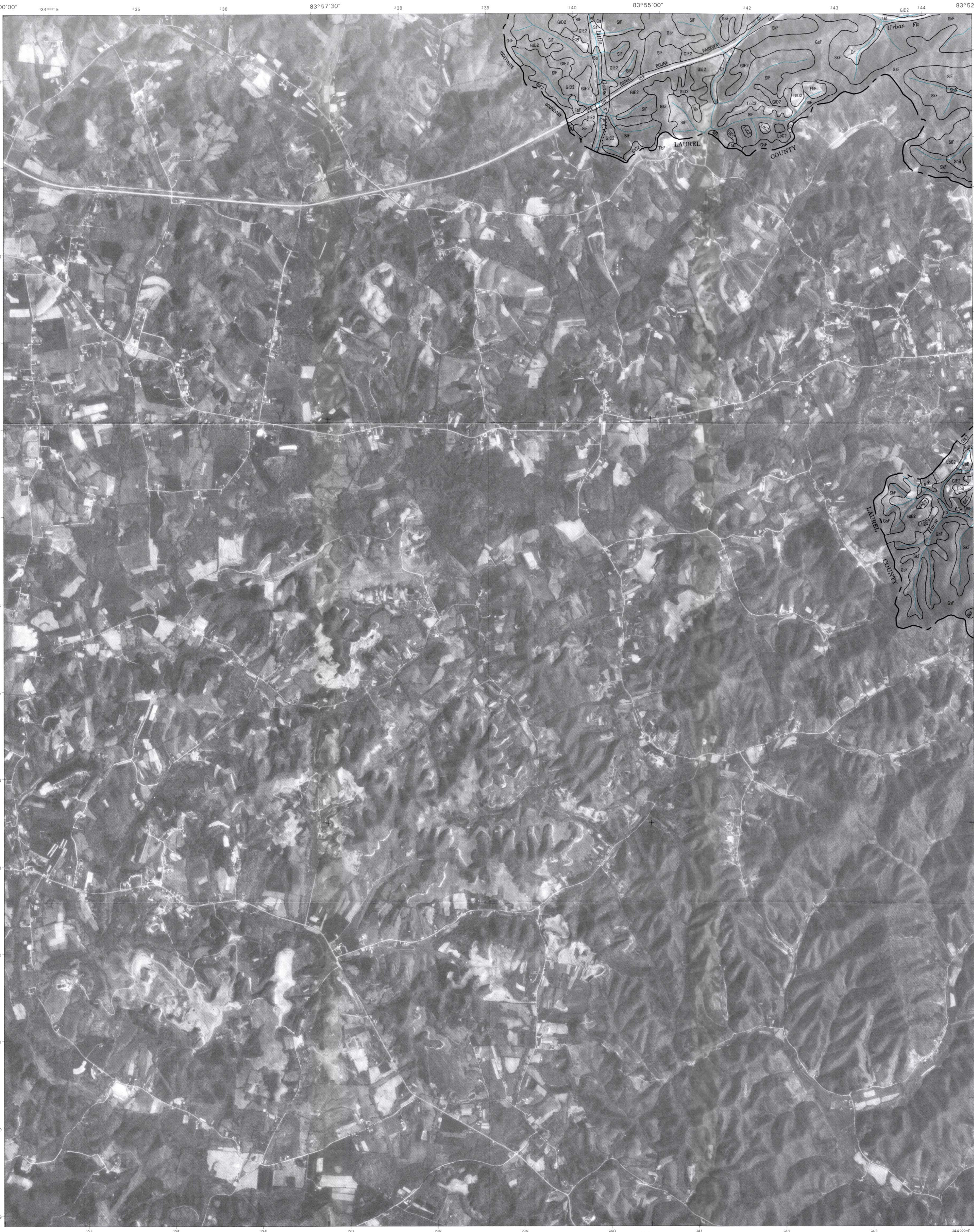
BIG CREEK, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 8 OF 14

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 LONDON
2 PORTERSBURG
3 MANCHESTER
4 LILY
5 HIMA
6 CORBIN
7 HEIDRICK
8 FOUNT

INDEX TO ADJOINING 7.5 MAPS

BLACKWATER, KENTUCKY

7.5 MINUTE SERIES
SHEET NUMBER 9 OF 14

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, KENTUCKY
HIMA QUADRANGLE
SHEET NUMBER 10 OF 14

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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 PORTERSBURG
2 MANCHESTER
3 BARCREEK
4 BLACKWATER
5 OGLE
6 HEIDRICK
7 FOUNT
8 SCALF

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HIMA, KENTUCKY
7.5 MINUTE SERIES
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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, KENTUCKY
OGLE QUADRANGLE
SHEET NUMBER 11 OF 14

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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid. 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximate. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

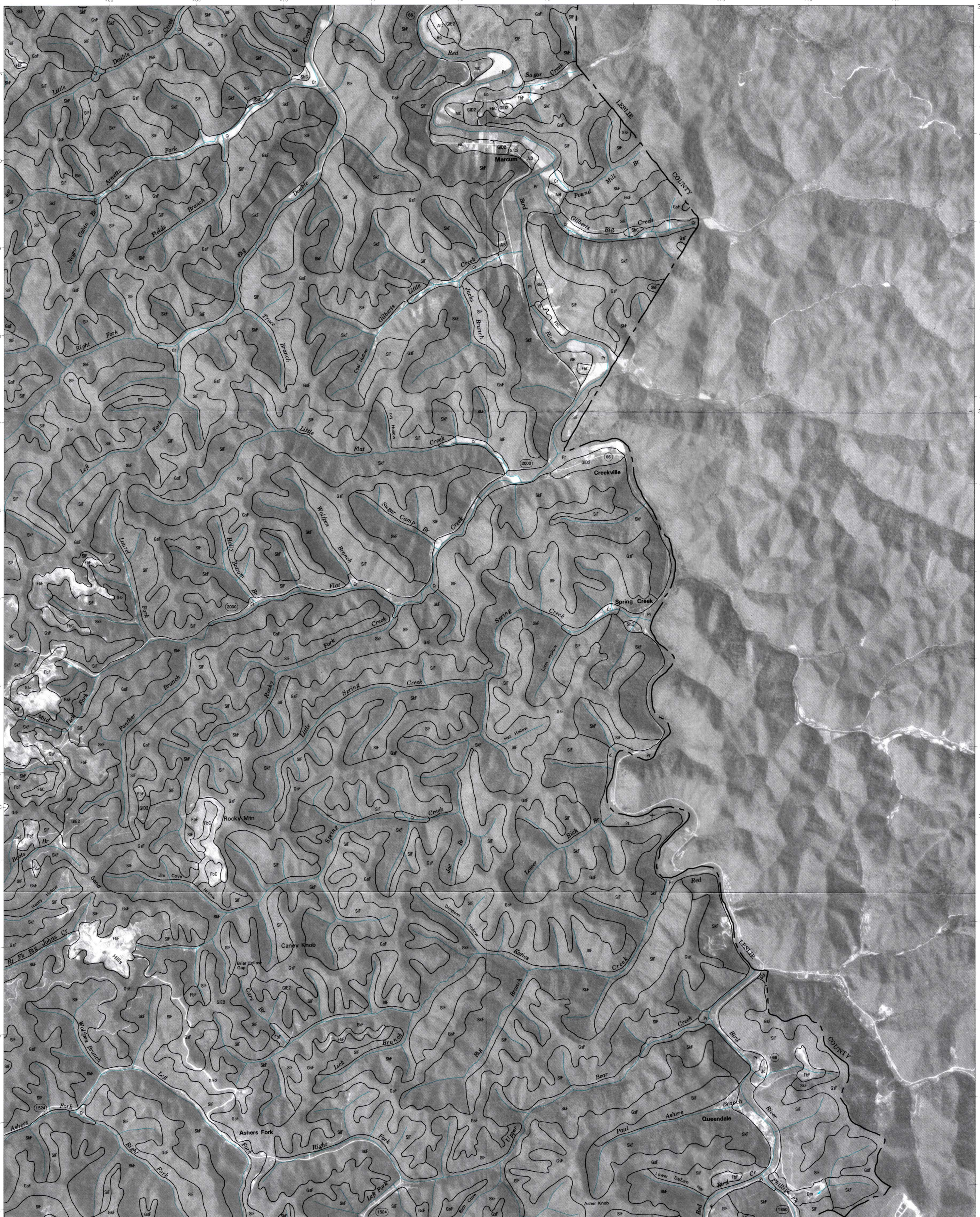
QUADRANGLE LOCATION

OGLE, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 11 OF 14

1 MANCHESTER
2 BARCREEK
3 BIG CREEK
4 HIMA
5 CREEKVILLE
6 FOUNT
7 SCALF
8 BEVERLY

INDEX TO ADJOINING 7.5 MAPS

83° 37'30" 37° 07'30" — 83° 35'00" — 83° 32'30" — 83° 30'00" 37° 07'30"



37° 00'00" 83° 37'30" — 83° 35'00" — 83° 32'30" — 37° 00'00" 83° 30'00"

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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

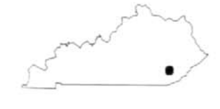
NORTH

SCALE 1:24000

1 — 0 — 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 — 0 — 1 KILOMETERS



QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 BARCREEK
2 BIG CREEK
3 HYDEN WEST
4 OGLE
5 HOSKINSTON
6 SCALF
7 BEVERLY
8 HELTON

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CREEKVILLE, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 12 OF 14

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, KENTUCKY
SCALF QUADRANGLE
SHEET NUMBER 13 OF 14

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North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

SCALF, KENTUCKY
7.5 MINUTE SERIES
SHEET NUMBER 13 OF 14

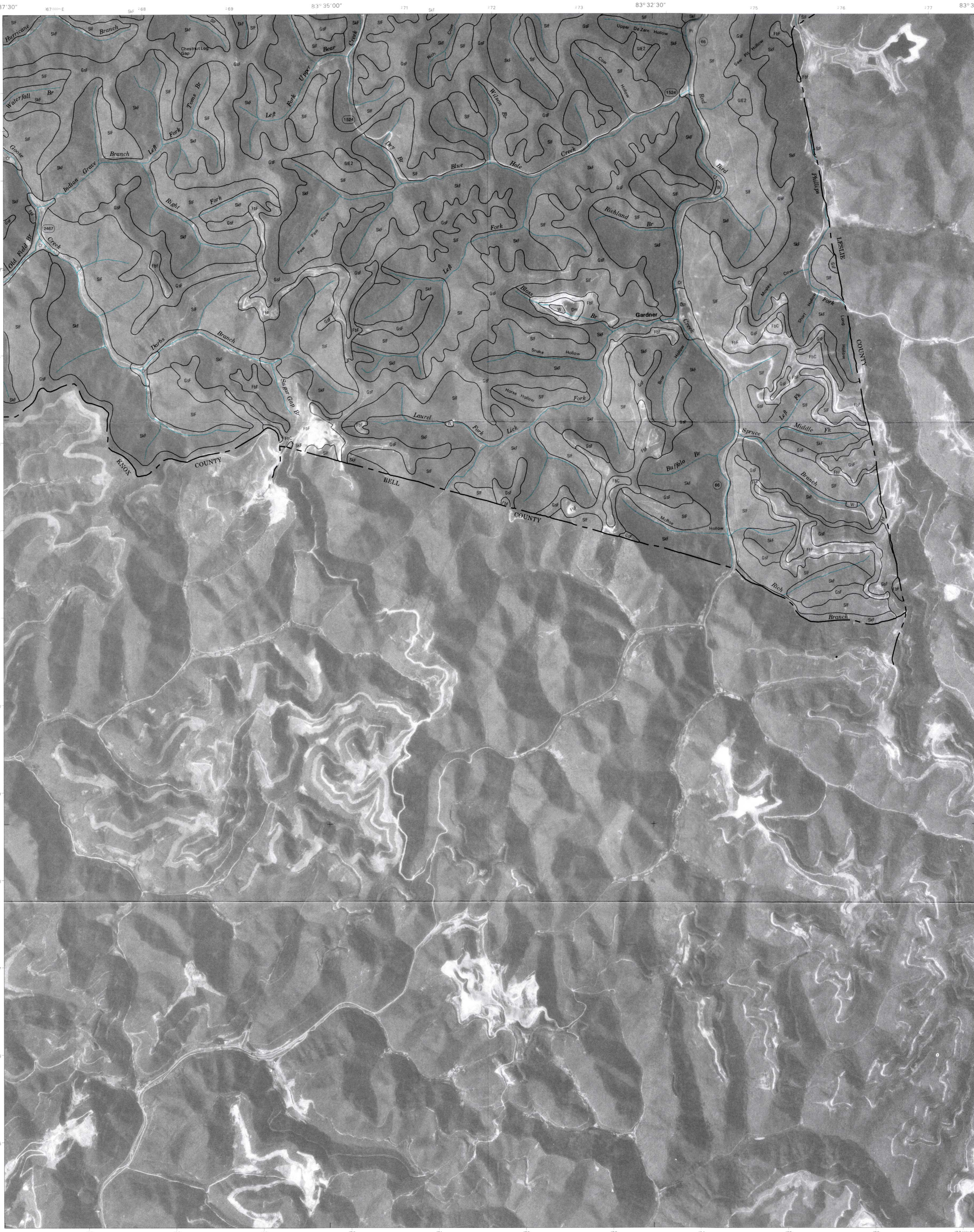
1	2	3
4		5
6	7	8

1 HIMA
2 OGLE
3 CREEKVILLE
4 FOUNT
5 BEVERLY
6 ARTEMUS
7 PINEVILLE
8 BALKAN

INDEX TO ADJOINING 7.5 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, KENTUCKY
BEVERLY QUADRANGLE
SHEET NUMBER 14 OF 14



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KILOMETERS

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 OGLE
2 CREEKVILLE
3 HOSKINSTON
4 SCALF
5 HELTON
6 PINEVILLE
7 BALKAN
8 WALLINS CREEK

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BEVERLY, KENTUCKY
7.5 MINUTE SERIES
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